TEXAS TECH UNIVERSITY®

Obesity Research Cluster

2nd Annual Meeting and Poster competition

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SCHEDULE

3:00-3:20 pm	**Welcome and Introductions** (Room 169) Dr. Moustaid-Moussa, Dean Hoover, VPR Duncan, and TTU/HSC Deans
3:20-3.35 pm	**ORC overview and report** Dr. Naima Moustaid-Moussa
3.40-4:30 pm	**Connecting the Dots: Opportunities for Interdisciplinary Research and Education** Dean Cynthia Peterson, college of Sciences, LSU
4:30-5:30 pm	**Networking activities** (Canyon Room) **Discussion of Funding Opportunities** Dr. Debra Reed
5:30 -5:45 pm	**Summary & Closing remarks** Dr. Moustaid-Moussa
6:00- 8:30 pm	**Poster presentations and reception** (Canyon room and COHS breezeway)

Anti-atherogenic effects of lesion-targeted epigallocatechin gallate (EGCG) - loaded nanoparticles

Jia Zhang, Shufang Nie, Md Nazir Hossena,Ming Sun, Raul Martinez-Zaguilan, Souad Sennoune, Shu Wang.
Nutritional Sciences, TTU

Abstract

Objectives: Macrophages are determinant cells for atherosclerotic lesion formation. The objectives of this study were to incorporate macrophage target ligands on the surface of biocompatible and biodegradable epigallocatechin gallate (EGCG)-loaded nanoparticles (Enano), to evaluate their target specificity to macrophages and anti-atherogenic effects *in vitro* and *in vivo*. Method: The target specificity to macrophages (*in vitro*) and to atherosclerotic lesions in low density lipoprotein receptor knockout (LDLr-/-) mice was measured using a fluorescence microscopy and IVIS® *in vivo* imaging system, respectively. Macrophage cholesterol content was determined using a HPLC method, and macrophage monocyte chemoattractant protein 1 (MCP-1) release was measured using an ELISA kit. After treating LDLr-/- mice with EGCG, untargeted Enano, targeted Enano, void untargeted nano, void targeted nano, or saline via weekly intravenous injection for 20 weeks, atherosclerotic lesion area and inflammatory response were determined. Results: As compared to untargeted Enano, targeted Enano significantly increased their binding affinity to THP-1 macrophages,increased macrophage EGCG content and decreased macrophage expression and release of MCP-1. The targeted Enano improved the target specificity to atherosclerotic lesions, and decreased atherosclerotic lesion area and inflammatory responsein LDLr-/- mice. Conclusions: Targeted nanoparticles represent a potential breakthrough in molecular imaging of atherosclerosis and have a potential for the prevention and treatment of atherosclerosis. Grant Funding Source: Grant Funding Source: NIH 1R15AT007013-01

The effects of EGCG and EGCG nanoparticles on body weight and body composition in LDL receptor null mice

Yujiao Zu, Jia Zhang, Shufang Nie, Shu Wang
Nutritional Sciences, TTU

Abstract

Objective: We successfully synthesized epigallocatechin-3-gallate (EGCG) encapsulated nanoparticles (Enano), and incorporated macrophage-targeting ligands on the surface of Enano (L-Enano). The objective of this study is to investigate the effect of EGCG, Enano and L-Enano on body weight, food intake and body composition of LDL receptor null mice (LDLr-/- mice).Method: Male LDL r-/- mice were fed with an atherogenic diet and received intravenously administration of 1×PBS, EGCG, Enano, or L-Enano dissolved in 1×PBS at EGCG dose 25 mg/kg body weight for 22 weeks. Food intake and body weight were measured weekly by manual weighing using an electronic laboratory balance, body composition was measured at week 0,10 and 22 using EchoMRI Body Composition Analyzer. Results: Food intake was similar among all groups. As compared to 1×PBS group, all treatment groups decreased body weight, body fat mass and body fat percentage. L-Enano compared to Enano decreased body fat percentage. Mice treated with EGCG had less body weight and body fat mass than mice treated with Enano or L-Enano. Conclusion: LDLr-/- mice treated with free EGCG lost more body weight and body fat mass than mice treated with EGCG nanoparticles.

Dean Cynthia Peterson

Connecting the Dots: Opportunities for Interdisciplinary Research and Education

LSU, college of sciences

About the Speaker

Dr. Cynthia Peterson is the first female to become the Dean of the College of Science at Louisiana State University. She has earned a Ph.D. in biochemistry from the LSU Medical School in Shreveport and has completed postdoctoral training at the University of California, Berkeley. She has previously held positions as a professor and head of department of Biochemistry and Cellular and Molecular Biology and associate dean of academic personnel in the College of Arts and Sciences, at the University of Tennessee-Knoxville. Dr. Peterson also served as a director of the graduate program in Genome Science and Technology, a joint program between UTK and the Oak Ridge National Lab. Dr. Peterson has had a very successful academic career in structural and computational biology funded by NIH and AHA. She is passionate about student training and mentoring, especially for women and underrepresented groups in science. She served as a PI on training grants from NSF and NIH. Dr. Peterson is Fellow of the AAAS and has been active in a variety of interdisciplinary programs and graduate training activities. She served as associate director of the National institute for Mathematical and Biological Synthesis, a resource center funded by NSF, to host international teams to foster new developments in mathematical biology.

POSTER PRESENTATIONS

Parenting style and home environments and their relationships to obesity in Arab children living in urban Texas

Suzan H. Tami, MS. and Debra B. Reed, PhD, RDN, LD

Nutritional Sciences, TTU

Abstract

Objective: Assessing relationships between Arab mother parenting styles, home obesogenic environments, and child's body mass index (BMI). **Methods:** Twenty-three mothers completed Caregiver's Feeding Styles Questionnaire (CFSQ) and Family Nutrition and Physical Activity (FNPA). Demandingness and responsiveness were derived from CFSQ scores, and mothers were categorized into four parenting styles. For home obesogenic environment, FNPA score means were calculated. Correlations tested associations between feeding styles, home obesogenic environments, and child's BMI z-scores. **Results:** Although all mothers reported being authoritative, only seven were categorized as using authoritative feeding style based on their CFSQ scores on demandingness (median= 2.84) and responsiveness (median= 0.96). The FNPA mean was 3.18 indicating less home obesogenic environment. No significant associations between reported feeding styles, home obesigenic environments, and child's BMI z-scores. However, child's BMI z-scores were significantly correlated with "Allow the child to choose the foods he or she wants to eat for dinner from foods already prepared" (r = .428, p = .008) in CFSQ, "Breakfast pattern" (r = -.356, p = .031), and "Restriction and reward" (r = -.351, p = .033) in FNPA. **Conclusions:** Assessing parenting styles and home environments regarding dietary and physical activity behaviors of Arab families is the first step to developing effective nutrition education programs for Arab populations. **Acknowledgments:** Special thanks go to the Arab mothers participated in this study and the MAS Islamic Center of Dallas their cooperation and help.

Qualitative research identifies intervention needs of military parents to prevent childhood obesity.

Ashlee Taylor, Debra Reed
Nutritional Sciences, TTU

Abstract

Obesity is affecting US military service members and their children at rates similar to civilians. To determine intervention needs, focus group discussions were held at one Air Force and one Army Military Base in the Southwestern US. Parents of children ages 3-5 who attend Base Child Development Centers (CDC) were invited to participate. Using modified principles of motivational interviewing, researchers asked parents about challenges to meeting recommendations to prevent childhood obesity, specifically these 7 Healthy Habits: eating more whole grain foods and more fruits/vegetables; getting more physical activity; consuming fewer sweet drinks; having less screen time; sleeping more; and having more family meals. Twenty-two parents (active military or spouses) participated. Themes suggested that parents struggled with effective parenting skills including how to deal with picky eating. In addition, time demands of balancing parental responsibilities interfered with achieving the 7 Healthy Habits: homework, and bathing and bonding time, versus time spent in meal planning, especially when the latter could be accomplished by selecting fast food. Single parent households (and those who become single parents due to spousal deployment) appeared to face greater struggles in meeting the 7 Healthy Habits. Another common source of stress in these military families was meeting the annual military fitness requirements—which may contribute to body image issues for the entire family as per this parent quote to son who doesn't want to exercise "you do not want to end up big and fat." We found that blended families with large age gaps between children are common, resulting in a need for child health information that includes a wide age range. Parents expressed greater concern for their older children's health, as they perceived themselves to have less control over their health habits as compared to those of the preschool age children, and they felt that that the Base CDC were already providing adequate nutritional and physical activity support for their younger child. Overall, the study shows the need to address nutrition needs for the whole family (children of other ages and parental stressors), in interventions targeting military families, to better meet their needs for obesity prevention.

Eicosapentaenoic Acid (EPA) Supplementation Regulates Hepatic Lipid Metabolism and Inflammation in Diet Induced Obese Mice

Kembra D Albracht-Schulte[1], Latha Ramalingam[1], Nishan S Kalupahana[2], Cecile Brocard[1] and Naima Moustaid- Moussa[1].
[1]Department of Nutritional Science, TTU, and [2]Department of Physiology, University of Peradeniya, Sri Lanka.

Abstract

Non-alcoholic fatty liver disease (NAFLD) affects more than 70% of obese patients. Omega 3 polyunsaturated fatty acids, such as eicosapentaenoic acid (EPA), are potent hypotriglyceridemic agents. Our lab has previously reported that EPA prevented and reversed high fat (HF) diet-induced obesity, insulin resistance, and hepatic steatosis as indicated by reduced hepatic triglyceride accumulation. However, the mechanisms mediating these effects of EPA are not completely understood. To address this question, liver samples were obtained from C57BL/6J mice fed HF diet, either with EPA (HF-EPA) or without (HF). EPA supplementation revealed significant decreases in genes related to fatty acid synthesis, such as fatty acid synthase, and increases in expression of genes involved in fatty acid oxidation, such as peroxisome proliferator-activated receptor alpha, suggesting a switch of liver metabolism from an anabolic lipogenic state to an oxidizing state. Moreover, several anti-inflammatory markers were also up-regulated with EPA supplementation, while pro-inflammatory markers were reduced. In summary, our data indicate that EPA regulates expression of lipid and inflammation-related genes, independent of obesity. Detailed mechanistic studies are ongoing. Regardless, these findings may provide additional rationale for EPA supplementation for patients with fatty liver.

Adipocyte-Breast Cancer Cell Interactions: Preventive Effects of Omega-3 Fatty Acids

Arwa Aljawadi, Meriam Ouertani, Nalin Siriwardhana, Shane Scoggin, Lauren Gollahon, Surangani Dharmawardhane, Naima Moustaid-Moussa

Departments of Nutritional Sciences and Biological Sciences, TTU
University of Puerto Rico, San Juan, PR

Abstract

According to the American Cancer Society, breast cancer is the most common type of cancer and the second leading cause of death among women in the United States. Menopausal women with obesity face a higher risk of developing breast cancer. Our hypothesis is that omega-3 fatty acid, eicosapentaenoic acid (EPA) regulates adipocyte-secreted factors thereby modulating breast cancer cell metabolism. To test this hypothesis, we investigated the interaction between adipocytes and breast cancer cells with emphasis on the role of omega 3 fatty acids in modulating this interaction. To accomplish this, the effects of conditioned media from 3T3L1 preadipocytes/differentiated adipocytes or human mesenchymal stem cells on MCF7 breast cancer cells and vice versa were analyzed. Cells were treated with 100μM of EPA, prior to conditioned media transfer. Conditioned media from EPA-treated adipocytes reduced interleukin-6 (IL-6) and monocyte chemoattractant protein-1 (MCP-1) secretion from MCF7 cells. To further determine whether conditioned media affects cell energy metabolism, glycolytic activity was measured using seahorse extracellular flux analyzer. Glycolysis as estimated by extracellular acidification rate was reduced in MCF7 cells exposed to conditioned media from 3T3L1 preadipocytes treated with EPA. These results suggest that adipocyte-secreted factors modulate breast cancer cell inflammation and glucose metabolism. Importantly, we identified that the anti-inflammatory nutrient, EPA could be used for a preventive approach in adipocyte-breast cancer cell interactions. Preventive effects of EPA in post-menopausal obesity-associated breast cancer merits further investigation.

Are eggs a novel dietary aid for the treatment and management of obesity?

Dylan Bailey, *Nikhil V. Dhurandhar, Jamie Cooper, John Dawson and Allison Childress*
Nutritional Sciences, TTU

Abstract

Obesity is one of the most significant global public health issues. Although a reduced energy intake and increase in activity form the cornerstone of obesity treatment and management, long-term compliance with these interventions is difficult. Therefore, eating less and moving more may not be effective in causing biologically meaningful weight-loss for many. Interestingly, employing eggs as a dietary aid to enhance weight-loss and management is a novel strategy receiving much attention. Eggs are a naturally occurring, high quality, and complete source of protein, whose ability to induce satiety may assist in reducing food intake during subsequent meals. Some researchers suggest that higher quality protein foods, such as eggs, can help with inducing satiety in a safer and more potent way than previously documented with higher quantity protein diets. To this, many mechanisms exist which offer explanation for eggs capacity to reduce food intake. The protein content found in eggs can induce a physiological effect on appetite regulation. Leucine, a notorious marker of high quality protein sources, may also impact energy intake. Regardless, the highly satiating nature of eggs and potential to reduce later mealtime energy intake has been explored when consumed at breakfast and in addition to following a weight loss diet. Eggs were shown augment weight loss, however, much more in the way of research is needed to assess the capabilities of eggs to prevent weight gain or enhance weight loss. For now, eggs remain an exciting dietary prospect for obesity treatment and management.

BMI and Pain Predict Activities of Daily Living (ADLs) in an Obese Sickle Cell Disease (SCD) Clinic Population

Lori Boyd[1], Chanaka Kahathuduwa[1], Kelli Kaufman[1], Mary Wood[2], Camela Barker[2], Rosellen Reif[2], Keith E. Whitfield[2], Christoper L. Edwards[2] and Martin Binks[1].

[1] Behavioral Medicine and Translational Research Lab, Nutritional Sciences, TTU.
[2] Department of Psychiatry and Behavioral Sciences, Department of Medicine, Duke University Medical Center, Durham, NC.

Abstract

Background: Our prior work suggests an association of pain and obesity with activities of daily living (ADLs). Pain and impaired ADLs are factors in SCD. Obesity is becoming an issue in SCD as longevity improves. We hypothesized that increased BMI and pain would be associated with greater impairments in ADLs. **Methods:** We conducted archival cross-sectional analysis of 226 records of consecutive adult African-American clinic patients receiving routine follow-up care, collected via survey and medical records review as part of an ongoing study at Duke Comprehensive SCD Center (age M=33.6yrs; BMI M=26.3kg/m^2; F=55%). ANOVA and regression analyses were performed on subsets of the data based on available data and weight status. Study variables included BMI (measured height and weight), Short Form McGill Pain Inventory (SFMPQ), and ADLs Scale. **Results:** Weight-related prevalence (BMI; kg/m^2; N=226): Normal Weight (NW) 18.5-24.9 (53%); Overweight (OW) 25-29.9 (26%); Obese (OB) >30 (21%). One way ANOVA indicated OB patients had higher present pain index (PPI) scores than NW (p=.033).Pearson's correlation (OB) indicated an association of Sensory Pain , Affective Pain and Present Pain with impairments in Physical ADLs (p's =0.043; 0.002; 0.002) and Total ADLs (p's=0.046; 0.036; 0.0001). BMI negatively correlated with impairments in Total ADLs (p=0.046). Regression analysis indicated PPI (p=0.001) and BMI (p=0.024) predicted impairments in Total ADLs with higher PPI and lower BMI predicting greater impairments. **Conclusions:** Prevalence of overweight and obesity seem to be increasing among SCD patients. Impairments in ADLs in SCD patients seem to increase with increasing pain and decreasing BMI.

Anti-Inflammatory Effects of Extracts from a Bioenergy Crop, Switchgrass, in Cultured Adipocytes

Richard L. Garrison[1], Shane Scoggin[1], Nalin Siriwardhana[1], Nicole Labbé[2], Bonnie Ownley[2], Kimberly Gwinn[2], Doris D'Souza[2] and Naima Moustaid-Moussa[1]

[1]Department of Nutritional Sciences, TTU, [2] University of Tennessee Institute of Agriculture, Knoxville, TN

Abstract

Obesity is a low-grade inflammatory condition that is associated with several metabolic diseases such as diabetes and cardiovascular disorders. Moreover, bioactive compounds from food and botanicals have been shown to reduce inflammation. However, anti-inflammatory roles of switchgrass, a bioenergy crop is currently unexplored. Hence, we hypothesize that bioactives from switchgrass may have potential benefits on obesity-related inflammation by reducing proinflammatory adipokines. Bioactives were isolated from chopped switchgrass using ethanol. To test our hypothesis, 3T3L1 preadipocytes were pretreated with the crude ethanol extracts or extracts fractionated into different organic solvents, followed by lipopolysaccharide (LPS) to determine if the extracts reduced LPS-induced inflammation. Interestingly, some of these extracts reduced significantly and in a dose-dependent manner, secretion of Monocyte Chemotractant Protein-1 (MCP-1) and Interleukin-6 (IL-6) from 3T3-L1 cells. Furthermore, using MTT assays, some extracts significantly reduced cell viability while others did not. In summary, these findings demonstrate that switchgrass-derived bioactives reduce adipocyte inflammation and provide the first evidence for an added value of switchgrass in obesity-related inflammation. Additional studies are needed to characterize the specific phytochemicals responsible for the reduction in inflammation and their mechanism of action. In conclusion, bioenergy crops such as switchgrass are economically viable sources of anti-inflammatory dietary supplements.

A Cross Sectional Descriptive Study with Further Analysis of Body Mass Index, Psychosocial Correlates and Pain as Predictors of Activities of Daily Living in African American Adult Sickle Cell Disease Clinic Patients

Kelli Kaufman BS[1]

Nutritional Sciences, TTU

Abstract

Background: Pain, psychosocial issues and impaired activities of daily living (ADLs) are common among sickle cell disease (SCD) patients. Advances in treatment has increased longevity of patients with SCD, making them susceptible to lifestyle-influenced diseases (e.g. obesity). We aimed to describe selected medical and psychosocial characteristics of SCD clinic population and to determine if BMI, psychosocial distress and pain predict impairments in ADLs. **Methods:** Archival baseline data from 252 adult African American SCD clinic patients were extracted from a larger dataset from ongoing longitudinal study at Duke SCD Center. Original study data was collected using medical records review and LEMPFSCD questionnaire which included age, gender, BMI, hydroxyurea treatment status, SCD type, ADLs and validated measures including: SCL-90-R subscales: depression, anxiety, Global Severity Index(GSI); AESSI. Pain was measured via SF-MPQ subscales: Sensory Pain (SP), Affective Pain (AP) Present Pain Intensity (PPI). **Results:** Mean BMI of the sample (N=252) was 25.8kg/m^2 with 44% being >25kg/m^2. Depression, anxiety and GSI were in clinical range. Males and females differed in BMI (P=0.005) and complex ADLs (P=0.008). Patients with SCD types HbSβ^+-thalassemia and HbSC had higher BMIs than those with HbSS(P<0.001). In predictive models of whole sample, higher AP and age predicted impairments in total ADLs and AP predicted impairment in physical ADLs. In an OW/OB subsample, AP, age and SCD severity predicted impairments in total and physical ADLs. **Conclusions:** Our finding of a consistent relationship of AP to ADL impairment suggests that focusing on AP through multidisciplinary behavioral pain management programs may improve functioning.

Inactivation of Adipose Angiotensinogen Reduces inflammatory Adipokines and Adipose Tissue Macrophages

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Abstract

Adipose rennin-angiotensin system has been linked to obesity and metabolic syndrome. Previously we showed that overexpression of Angiotensinogen (Agt) in adipose tissue increased insulin resistance, adipose and systemic inflammation in mice fed a low fat (LF) diet. To further dissect the direct role of adipose Agt in metabolic disorders, we have created an adipose specific Agt knockout (Agt-KO) mice using the Cre-LoxP system. Agt-KO and control (WT) littermates were fed either a LF or high fat (HF) diet to assess metabolic changes. Surprisingly, most metabolic parameters (bodyweight and fat mass, glucose and insulin tolerance tests) were comparable between the WT and Agt-KO littermates in both diets. Analyses of adipose tissue gene expression indicated shifts in angiogenesis and insulin signaling in the Agt-KO mice fed LF diets when compared to the WT mice. MCP1 gene expression was also down regulated in adipose tissue of the Agt-KO vs. WT littermates. These changes correlated with MCP-1 and Leptin protein expression, both of which were down regulated in the Agt-KO. Moreover, targeted inactivation of adipose Agt reduced total macrophage infiltration in both the LF and HF fed Agt-KO mice. This was in contrast to the total adipocyte area, which did not change between the two genotypes. In conclusion, despite the lack of an obvious phenotype in adipose Agt deficient mice, cellular and molecular changes observed are consistent with previously reported functions of RAS in insulin resistance, and inflammation. *Grant Support: AHA & TTU (COHS & OVPR).*

FTIR microspectroscopy imaging technique and its application for material

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[1] Fiber and Biopolymer Research Institute, Dept. of Plant and Soil Science, TTU and. [2] Nutritional Sciences, TTU.

Abstract

Fourier Transform Infrared spectroscopy (FTIR) has been established as a powerful analytical tool to analyze a wide range of materials. Traditional FTIR analyses have been made with devices capable of performing single measurements, thus, providing a single IR spectrum of the sample. However, with recent technological development FTIR devices can now image larger sample area, providing not only spectroscopic information but also spatial distributional information. In addition, the development of Focal Plane Array (FPA) has made FTIR imaging an emerging area of chemical imaging research. The FTIR microspectroscopy imaging is currently being employed to determine the distribution of chemical functional groups especially in cancerous tissues, pathogenesis and repair of cartilages, and diverse range of human and plant tissues and even in individual cells. In this research, we explored the use of FTIR imaging to study the chemical distribution in different materials: (1) type and distribution of oil within a commercial potato chip, (2) variation of chemical composition and distribution within developing cotton fibers, and (3) lipid distribution in a mouse liver tissue. The preliminary results show the potential applications of FTIR microspectroscopy imaging to nutrition and obesity research. Specifically, FTIR can determine changes in lipid accumulation in adipose tissue as well as in liver.

Eicosapentaenoic acid Increases Brown Adipose Tissue Thermogenic Markers in High Fat Fed Mice

Mandana Pahlavani[1], Fitia Razafimanjato[1], Nishan S. Kalupahana[2], Shane Scoggin[1], Latha Ramalingam[1], and Naima Moustaid-Moussa[1]

[1]Department of Nutritional Sciences, TTU, [2]Faculty of Medicine, University of Peradeniya, Sri Lanka

Abstract

Brown adipose tissue (BAT) converts excess food energy into thermal energy, and has therefore attracted attention as a new area of research to counter obesity. We previously reported that eicosapentaenoic acid (EPA) reduces high fat diet-induced obesity and insulin resistance in mice, independent of energy intake; however, the role of EPA in regulating thermogenesis in brown fat is not well understood. Hence, we hypothesize that EPA induces thermogenesis in brown fat to counteract obesity and insulin resistance. To test our hypothesis, C57BL/6J mice fed with high fat (HF) with or without EPA were used. BAT from HF-EPA mice expressed higher mRNA levels of thermogenic genes such as FNDC5 and PGC1-alpha, compared to HF mice. Furthermore, EPA up-regulated uncoupling protein 1 (UCP-1) protein content in BAT. Another key marker for brown fat thermogenesis, PRDM16, was also significantly higher in EPA fed mice vs HF, confirming thermogenesis induction. To further study direct effects of EPA on BAT, a clonal brown fat cell line, HIB1, was treated with different doses of EPA. Mitochondrial content measured using a MitoTracker was dose-dependently and significantly higher in EPA treated vs. vehicle, suggesting higher mitochondrial activity in EPA treated cells. Currently, cell and molecular studies are underway to determine mechanisms mediating EPA effects on brown adipocyte metabolism and mitochondrial function. In conclusion, our results from *in vivo* and *in vitro* studies indicate that EPA reduces obesity and its associated metabolic disorders at least in part by activating BAT thermogenesis.

WHY FROGS DON'T GET FAT

Prater, C., and Harris, B.N., Carr, J. A.
Department of Biological Sciences, TTU

Abstract

Research on the neuroendocrine regulation of food intake has been driven, in part, by the need to understand *how* the mechanisms regulating food intake may be altered in obesity. Since the discovery of leptin, research on these mechanisms has focused primarily on the role of discrete hypothalamic nuclei, and the neuropeptides expressed therein, in controlling food intake. In our lab, we address another question: *Why* do animals stop eating? By studying the neuroendocrine modulation of feeding in light of the ecological and evolutionary forces that guide optimal foraging strategies we hope to uncover novel regulatory mechanisms. Our recent work has focused on the role of satiety peptides, such as corticotropin-releasing factor (CRF), in modulating visual pathways that are critical for foraging and predator avoidance decisions. Previous work in our lab using an amphibian model indicates that the visual system possesses an intrinsic CRF signaling system which could play a role in modulating the rapid perception and recognition of food. CRF content in the optic tectum changes in response to energy balance (*decreased* following food deprivation) and stressors (*increased* following ether vapor exposure). Collectively, my data suggest that CRF can act on a previously un-described target, the subcortical visual system, to rapidly shut off food intake in response to a threat. The relationship to anxiety based feeding disorders in humans will be discussed.

Inflammatory and Metabolic changes following Bariatric Surgery

Nadeeja N. Wijayatunga[1], Valerie G. Sams[2], Camille D. Blackledge[2], Nalin Siriwardhana[1], Matthew L. Mancini[2], Gregory J. Mancini[2], John A. Dawson[1],Naima Moustaid-Moussa[1]

[1]Nutritional Sciences, TTU [2]Department of Surgery, University of Tennessee Medical Center Knoxville, TN

Abstract

Bariatric surgery is beneficial not only in inducing significant weight loss but also improving insulin sensitivity thereby reducing morbidity and mortality. However, the exact mechanisms are not fully understood yet. Metabolomics is a new approach to understand the changes in metabolism occurring in obesity and post bariatric surgery. Our objective was to study the changes in inflammation, lipid and amino acid metabolism following bariatric surgery. We hypothesize that bariatric surgery results in reduction in inflammation and improvements in metabolism resulting in improved insulin sensitivity. To test this, patients undergoing Roux En Y gastric bypass were recruited. Serum and subcutaneous adipose tissue (SAT) were collected during surgery, 2 weeks and 6 months post-surgery. SAT adiponectin and serum Interleukin-15 increased whereas C reactive protein decreased post-surgery. Free fatty acids levels were also significantly reduced post-surgery. Metabolomic analyses performed using Nuclear Magnetic Resonance spectrometry showed that branched chain amino acids (BCAA: Isoleucine, Leucine and Valine), 2-hydroxybutyrate and 3-hydroxybutyrate were significantly reduced 6 months post-surgery compared to time of surgery. These metabolic changes indicate alterations in fatty acid and amino acid metabolism and suggest possible reduction in insulin resistance that occurs following bariatric surgery. In depth analyses of metabolic profiles and pathways pre vs post- surgery are currently underway. In conclusion, our studies demonstrate significant improvements in lipid and amino acid metabolism with reduced inflammation that may contribute to enhanced insulin sensitivity following bariatric surgery.
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C/EBP-beta Regulates Lipid Homeostasis and Autophagy Activation in Liver and Macrophages.

MD KHURSHIDUL ZAHID[1], Allie Doyel[1], Rachel C Janssen[2], Shu Wang[1], Jacob E Friedman[2] and Shaikh M Rahman[1].
[1]Nutritional Sciences, TTU and [2]Pediatrics, University of Colorado Denver, CO

Abstract

Hyperlipidemia and macrophage foam cell formation result from dysregulation of lipid metabolism and are associated with obesity and atherosclerosis. Autophagy is a lysosomal degradative pathway that plays a crucial role in the metabolism and storage of cellular lipids. However, the molecular connection between autophagy and lipid homeostasis remains elusive. CCAAT/enhancer binding protein-beta(C/EBPβ) is a transcription factor and an important regulator of hepatic steatosis, inflammation, and ER stress. However, whether C/EBPβ plays a role in lipid balance in liver and macrophage foam cells via interacting with autophagy machinery remains unexplored. The present study demonstrated that hematopoietic C/EBPβ deletion in ApoE$^{-/-}$(C/EBPβ$^{-/-}$→ApoE$^{-/-}$) mice attenuated high fat/high cholesterol(HF/HC) diet (11 wks) mediated induction of hepatic and serum cholesterol levels and genes implicated in TG (fatty acid synthase, stearoyl-CoA desaturase) and cholesterol metabolism (HMG-CoA reductase) compared to control (WT→ApoE$^{-/-}$) mice. In addition, increased expression of autophagy protein (ATG5) and reduction of inflammasome activation were found in liver of (C/EBPβ$^{-/-}$→ApoE$^{-/-}$) mice. Interestingly, silencing of C/EBPβ in RAW 264.7 macrophage cells prevented atherogenic lipid mediated foam cell formation and cholesterol accumulation but increased autophagy activation, and cholesterol efflux. The present results suggest that C/EBPβ may interact with autophagy machinery to regulate lipid metabolism in liver and macrophage foam cells.
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