Wednesday November 4, 1:30 – 3:00pm

T-OR-2000
Romantic, Sexual, and Sexual Risk Behavior of Severely Obese Adolescent Females

Jennifer Becnel *Cincinnati OH*, Meg Zeller *Cincinnati OH*, Jennie Noll *State College PA*, David Sarwer *Blue Bell PA*, Jennifer Reiter-Purtill *Cincinnati OH*, Marc Michalsky *Columbus Ohio*, James Peugh *Cincinnati Ohio*, Frank Biro *Cincinnati OH*

Background: To document romantic, sexual and HIV/sexual risk behaviors as well as information sources for sexual and reproductive health in a clinical sample of severely obese (SO) adolescent females seeking weight loss intervention compared to healthy weight (HW) adolescent females.
Methods: This multi-site study—an ancillary to a prospective longitudinal observational study documenting health in adolescents having weight loss surgery (WLS)—presents pre-operative/baseline data from 108 females undergoing WLS, 78 SO females seeking lifestyle intervention, and 118 HW females. Romantic, sexual, and HIV/sexual risk behavior, sexual health outcomes (i.e., STIs/HIV and unintended pregnancy) were assessed using the Sexual Activities and Attitudes Questionnaire (SAAQ). Adolescent females also reported birth control information sources.
Results: These SO clinical groups were engaging in fewer romantic and sexual behaviors compared to HW females. However, and like HW females, there was a subgroup (25%) of SO females engaging in higher rates of HIV/sexual risk behaviors with WLS females reporting previous pregnancy (13%) and STIs (17.4%) prior to surgery. There were a considerable number (28-44%) of SO adolescent females who reported they received no birth control information from their physicians.
Conclusions: Despite lower engagement in general, SO females engaged in clinical weight management who were sexually active were at heightened risk for negative sexual health outcomes. Given the comorbidities of severe obesity, it is important to discuss sexual health to reduce the risk profile for SO females.

T-OR-2001
Perceived Parental Monitoring of Teen Activities: Differences between Adolescents of Healthy Weight and Excess Weight

Mary Beth Mccullough *Cincinnati Ohio*, Jennifer Becnel *Cincinnati OH*, Jennifer Reiter-Purtill *Cincinnati OH*, Yelena Wu *Salt Lake City UT*, James Peugh *Cincinnati Ohio*, Meg Zeller *Cincinnati OH*

Background: Parental monitoring of teen activities is associated with positive health outcomes among adolescents. We examined whether adolescent engagement and perceived parental monitoring of teen activities varied for youth of excess weight (overweight, obese, severely obese) compared to healthy weight (HW).
Methods: Using the 2008-2009 Monitoring the Future Study, adolescent perceived parental monitoring behaviors (e.g., checking homework, limiting TV) and self-reported engagement in these activities (e.g., doing homework, watching TV) were determined by weight status groups (CDC-defined BMI percentile) for a sample of 23,209 10th grade students (M age = 15.61 + 0.58 years; 53% female). Logistic regression analyses examined the impact of excess weight status group on adolescent perceived parental monitoring and adolescent activities, separately for males and females.
Results: Relative to HW adolescents of the same gender, males and females of excess weight reported greater odds of engaging in many activities, including those that are positive (i.e., doing homework) or obesity-promoting (i.e., watching TV). Interestingly, males and females of excess weight also perceived more parental monitoring in these areas relative to same gender HW adolescents.
Conclusions: Using a nationally representative sample, youth of excess weight perceived both greater rates and more perceived parental monitoring of their TV watching. Future research should examine what type of parental monitoring is effective in reducing obesity-promoting behaviors within clinical samples.

T-OR-2002
Weight Stigmatization Inhibits Feelings of Social Connectedness and Fuels Avoidance of Health Promoting Activities

Stephanie Nelson *Phoenix Arizona*, Alexandra Brewis *Tempe AZ*, Meg Bruening *Phoenix Arizona*

Background: The associated factors for overweight/obesity are an ongoing public health concern; however, no research has been conducted examining the relationship between weight stigmatizing situations and social connectedness. College freshmen are vulnerable as they transition into college environments and may experience shifts in their weight and social connectedness.
Methods: A cross-sectional survey was administered to college freshmen (n=221: 61.4% female; 52.5% non-white) living in dormitories while attending a large southwestern public university during the 2014-2015 school year. Multivariate linear regression models, adjusted for race/ethnicity, gender, parental education, Pell grant status, and dormitory residence assessed the relationship between weight stigmatizing situations, social connectedness, and overweight/obese status.
Results: The prevalence of overweight/obesity was 34.8%. Avoiding public places in fear of comments being made about size (β=-0.12; p=0.007) and being too embarrassed to participate in physical activity (PA) in public places because of weight status (β=-0.11; p=0.002) were inversely associated with social connectedness. Being overweight/obese was positively associated with avoiding public places (β=0.34; p<0.001) and not participating in PA out of embarrassment (β=0.34; p=0.006). No association was seen between social connectedness and overweight/obese status (β=0.05; p=0.434).
Conclusions: Overweight/obese students were more likely to avoid public places in fear of comments being made out of size and more likely to not engage in PA due to their size. Individuals who avoid going to places and were embarrassed of their size were less likely to report being socially connected. Resources are needed to help overweight/obese individuals overcome weight stigmatizing situations. Aid is needed for stigmatized individuals to become more socially connected and feel comfortable engaging in health promoting activities during this critical life stage.

T-OR-2003

Secretive Eating Among Youth Who are Overweight or Obese

Andrea Kass *Chicago Illinois*, Denise Wilfley *St. Louis Missouri*, Kamryn Eddy *Boston MA*, Kerri Boutelle *La Jolla California*, Nancy Zucker *DURHAM North Carolina*, Carol Peterson *Minneapolis MN*, Daniel Le Grange *San Francisco CA*, Angela Celio Doyle *Seattle wa*, Andrea Goldschmidt *Chicago IL*

Background: Secretive eating (SE) is characterized by eating privately to conceal being seen. SE may reflect eating- or body-related shame and may be a correlate of binge eating, which predicts excess weight gain over time and eating disorder onset. Parents often notice signs of SE in youth before other eating disorder behaviors are recognized, suggesting that increasing understanding of SE may facilitate efforts to improve weight outcomes and reduce eating disorder risk. This study aimed to evaluate the prevalence and psychosocial correlates of SE in youth who were overweight or obese.
Methods: Youth who were overweight or obese (N=577; age range: 6-18; mean age=11.2±2.5, 55% Caucasian, 66% female, 90% obese) presented to five research institutions. Height and weight were measured, and youth and their parents completed self-report measures of psychopathology. Analysis of covariance was used to compare youth who endorsed vs. denied SE, controlling for study site and age.
Results: SE was endorsed by 111 youth (19.2%). Youth who endorsed SE were older than their counterparts (p<.001), but there were no differences in race/ethnicity, sex, or zBMI (ps>.065). Compared to youth who denied SE, youth who endorsed SE had higher dietary restraint, eating concerns, shape concerns, and weight concerns and were more likely to endorse binge eating and purging (ps<.001). Groups did not differ in behavioral problems, depression, or self-esteem (ps>.109). When split by children (<13y) vs. adolescents (≥13y), dietary restraint and purging were elevated among adolescents (ps<.024) but not among children (ps>.06) who endorsed SE.
Conclusions: Youth who endorsed SE were older and had elevated eating-related psychopathology, suggesting a heightened risk for eating disorders. Screening for SE, particularly among older youth, may inform early identification of problematic eating behaviors, and understanding factors motivating SE and its implications for weight and eating pathology over time may improve intervention tailoring.

T-OR-2004

Relationship Between Sleep-Disordered Breathing, Depression Symptoms and Cognitive Outcomes in Overweight Sedentary Children: A Mediation Model

Monika Stojek *Athens GA*, Catherine Davis *Augusta Georgia*, Celestine Williams *Augusta GA*, Amanda Montoya *Columbus OH*

Background: Obesity negatively affects academic achievement and cognitive performance. One of the proposed mechanisms for that inverse relationship is hypoxia and sleep fragmentation resulting from sleep-disordered breathing (SDB). There is also a link between sleep-disordered breathing and depression, and depression symptoms have been associated with lower academic and cognitive performance.

However, these relationships have been understudied in children. In this study, we examine the interrelationships between SDB, depression symptoms, and academic and cognitive performance. We hypothesize that the relationship between SDB and academic and cognitive performance will be mediated by depression symptoms.
Methods: This study examined combined baseline data from the PLAY project (R01DK060692, NCT00108901) and the SMART study (R01HL087923, NCT02227095). A total of 314 overweight and sedentary children age 7-11 completed measures of sleep quality, depression symptoms and academic (Woodcock Johnson) and cognitive (Cognitive Assessment Scale) performance. Bootstrap estimates of indirect effects were calculated to test meditational models.
Results: The sample was 71% African American, 59% female; the mean age was 9, and the mean body fat was 39%. Controlling for SES and % body fat, depression symptoms mediated the relationship between SDB and Math Achievement ($R2 = 0.101$, $F[4, 289] = 8.13$, $p < 0.001$, 95% CI of indirect effects [-4.84, -0.18]), Reading Achievement ($R2 = 0.102$, $F[4, 289] = 8.19$, $p < 0.001$, 95% CI of indirect effects [-4.58, -0.24]), as well as the Attention scale of the CAS ($R2 = 0.073$, $F[4, 314] = 6.20$, $p < 0.001$, 95% CI of indirect effects [-4.58, -0.24]).
Conclusions: While there is an established link between SDB and academic and cognitive performance, the role of depression in this relationship had been understudied in children. It appears that targeting mood may improve cognitive outcomes in children. Conversely, it is important to monitor mood when treating SDB.

T-OR-2005

Prospective relationship of emotional and externally-induced eating with subsequent weight gain

Alison Field *Boston Massachusetts*, Kendrin Sonneville *Ann Arbor MI*, Melanie Kornides *Boston Massachusetts*, Jess Haines *Guelph ON*, Bernard Rosner *Boston MA*, Carlos Camargo *Boston Massachusetts*

Background: Emotional and externally-induced eating are more prevalent among overweight and obese youth, but it is unknown whether these constructs predict subsequent weight gain.
Methods: Using data from 1675 adolescent females in the ongoing Growing Up Today Study 2, we examined the prospective association between emotional and externally-induced eating, measured in 2011 with the Dutch Eating Behavior Questionnaire, and BMI change between 2011 and 2014. BMI was computed from self-reported weight and height collected on all questionnaires. International Obesity Task Force cut-offs were used to define weight status. Generalized estimating equations were used for the analysis, which controlled for age, BMI, and time spent watching TV in 2011. Emotional and externally-induced eating were both included in all models.
Results: In 2011, 21.5% of females were overweight or obese. Overweight and obese females had higher scores for emotional (p<0.0001) and externally-induced (p<0.02) eating than their leaner peers. Among healthy weight females, emotional and externally-induced eating were unrelated to BMI change, but among the overweight and obese females, quintile of emotional eating was inversely (B=-3.6, 95% confidence interval (CI) -4.0,-3.1) associated with BMI change, whereas, quintile of externally-induced eating was positively predictive of BMI gains (B=4.2, 95% CI 3.6, 4.8). Previous BMI change (2008-

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2011) was inversely predictive of change between 2011-2014 among the healthy weight females (p<0.01), but unrelated among the overweight and obese. When previous BMI change was added to the model, the associations with emotional and externally-induced eating were attenuated and no longer significant.

Conclusions: The associations between emotional and externally-induced eating and weight gain are complex. A subset of overweight and obese girls may be particularly susceptible to an obesogenic environment and thus gain excessive weight.

Wednesday November 4, 10:15-11:45 AM

T-OR-2006
Perinatal Exposure To a Low Omega-6 To Imega-3 Fatty Acid Ratio Protects Against Metabolic Dysfunction During Diet Induced Obesity

Michael Rudolph *Aurora CO*, Julie Houck *Aurora CO*, Jed Friedman *Aurora CO*, Paul MacLean *Aurora Colorado*

Background: After birth, rapid fat accumulation in the first 6 months of life is a powerful predictor of later obesity and metabolic risk. The ratio of essential dietary ω-6 to ω-3 fatty acids transmitted via mother's milk to infants has increased concordantly with the prevalence of obesity and metabolic diseases. Perinatal exposure to a high ω-6 to ω-3 milk fatty acid ratio (ω-6/ω-3) in both humans and rodent models is directly linked to increased adiposity later in life. We hypothesized that reducing the perinatal ω-6/ω-3 fatty acid ratio would program the adipose resulting in a healthier response to adult diet-induced obesity.

Methods: Dams overexpressing the C. elegans ω-3 fatty acid desaturase Fat-1 were used vs. WT. Lipid mass spectrometry was used to analyze milk fatty acid composition. Adipocyte cellularity of subcutaneous adipose in postnatal day 14 (PND14) was quantified using Cell Counting Analysis Program, and adipose gene expression by Affymetrix microarray. Body composition was measured by qMRI and energy balance quantified by indirect calorimetry.

Results: Milk fatty acid composition analysis by GC/MS revealed the ω-6/ω-3 ratio (20:4 ω-6)/(20:5 ω-3 + 22:6 ω-3) was significantly reduced (p=0.02), while total MUFA, PUFA and the ratio of 18:2 ω-6/18:3 ω-3 were unchanged in Fat-1 milk. By PND14, exposure to a low ω-6/ω-3 fatty acid ratio resulted in subcutaneous adipose with more adipocytes smaller in size. Genes associated with lipogenesis, inflammation, and cell cycle were decreased by low ω-6/ω-3 exposure. 17-week adults maintained on chow were challenged with high fat/sucrose diet. Mice exposed to the low ω-6/ω-3 fatty acid ratio as pups gained significantly less body weight, had 50% less body fat but equal lean mass, and had normal glucose tolerance.

Conclusions: These data suggest that perinatal exposure to a low ω-6/ω-3 fatty acid ratio alters adipogenesis and lipid deposition in offspring by PND14, leading to profound resistance to HFD-induced obesity and metabolic disease later in life.

T-OR-2007
Potential Effects of Embryo Genotype on Maternal Glucose Homeostasis: An Example of "fetal drive"

Peng Li *Birmingham AL*, David Allison *Birmingham AL*, Brandon George *Birmingham Alabama*, Tonia Schwartz *Birmingham Alabama*, Rudolph Leibel *New York NY*, Jill Carmody *Boston MA*

Background: It is commonly believed that the mother's phenotype during pregnancy affects both the short and long-term metabolic health of the offspring. In this study, we tested a complementary hypothesis: that the genotype of the embryo may affect the physiology of the mother during and after pregnancy.

Methods: Three wild type (wt) and 5 insulin receptor heterozygous null (Insr+/-) female mice on a C57BL6/129 background were fed an ad libitum high fat diet and bred to Insr+/- or wt males, respectively. The dams' pre-breeding (1 day prior to breeding) and postpartum (postnatal day 1) blood glucose levels were measured, and their offspring were genotyped for Insr. A general linear regression was conducted to examine the effects of the proportion of Insr+/- heterozygotes in the dam's first litter on the change in postpartum blood glucose, adjusted for dam genotype.

Results: After adjustment for the dam genotype, embryo genotype significantly affected postpartum changes in blood glucose among the dams (p=0.026). Specifically, the mean increment in postpartum glucose concentration in dams with all Insr+/- embryos is predicted to be 75 mg/dl (95% CI (13, 137)) less than in dams with all wt embryos. Further adjustment for change in dam adiposity did not change inferences from this analysis.

Conclusions: These preliminary, post hoc analyses suggest that embryo genotype at the Insr locus may affect metabolic physiology of the dam postpartum. Experimental studies with a larger sample size are warranted to confirm the finding.

T-OR-2008
Prenatal Exposure to Bisphenol A Perturbs Gene Networks and Key Regulators of Metabolic Disorders

Le Shu *Los Angeles CA*, Qingying Meng *Los Angeles CA*, Brandon Tsai *Irvine CA*, Xia Yang *Los Angeles CA*

Background: Both human epidemiology and animal model studies have revealed associations between Bisphenol A (BPA) exposure, especially exposure during early development, and metabolic disorders including obesity, cardiovascular disease, and type 2 diabetes. The underlying molecular mechanisms, however, remain elusive.

Methods: We profiled the transcriptome of hypothalamus and liver tissues that are important for metabolic control from 3-week-old mice that were prenatally exposed to BPA through oral gavaging the dams with BPA at 5 mg/kg body weight/day (no-observed-adverse-effect level) using RNA sequencing, followed by integrative network modeling.

Results: Prenatal BPA exposure led to low birth weight, dyslipidemia, and altered glucose homeostasis. These phenotypic changes were accompanied by large-scale transcriptomic alterations in the hypothalamus (101 genes and 48 transcripts with differential expression, and 66 genes with alternatively spliced exons) and liver (812 differential genes, 532 differential transcripts, and 64 alternatively spliced exons) at p <0.001. These gene signatures were enriched for diverse pathways related to pre- and postsynaptic nicotinic acetylcholine receptors, lipid metabolism, cholesterol biosynthesis, oxidative processes, and the extracellular matrix. Human homologues of these mouse transcriptomic signatures were significantly enriched for genetic signals uncovered from genome-wide association studies of obesity, type 2 diabetes, hypertension, and dyslipidemia. Using network biology, we

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derived hypothalamus and liver gene networks perturbed by BPA and identified key network regulators such as Cdh3 and Steap1 in the hypothalamus and Hmgcr and Lss in the liver. **Conclusions:** Our study not only provides systems-level insights into the molecular actions of prenatal BPA exposure and how these molecular perturbations contribute to metabolic disorders, but also suggests key network regulators that may serve as therapeutic targets.

T-OR-2009

Contribution of Pre-pregnancy Lean Body Mass to Glucose Metabolism Before and During Pregnancy in Untrained Women

Eva Carolina Diaz Fuentes *Little Rock AR*, Elisabet Borsheim *Little Rock Arkansas*, Kartik Shankar , Mario Cleves *Little Rock, AR 72202 AR*, Aline Andres *Little Rock Arkansas*

Background: Lean body mass (LBM) is generally associated with better insulin sensitivity. However, some studies have linked LBM with higher insulin levels in obese and post-menopausal women. These findings may relate to unique qualities of the skeletal muscle. The purpose of this study was to assess the contribution of prepregancy (PP) LBM to glucose homeostasis before and during pregnancy.
Methods: Body composition was assessed in 43 women (31±3 yrs.) at PP. Insulin and glucose levels were measured at PP and gestation week 10 and 30. An oral glucose tolerance test (OGTT) was performed at 30 wks. β cell function (%β) and insulin resistance (IR) were estimated by the homeostatic model assessment (HOMA2). Metabolic clearance rate of glucose (MCR) and 1st and 2nd phase insulin responses were estimated from the OGTT. Multiple linear regression analyses were performed with LBM index (LBMI), %FM, waist circumference, waist to hip ratio and gestational weight gain as independent variables.
Results: LBMI was positively associated with insulin levels and IR at PP and 30 wks. At PP, 10 and 30 wks. LBMI was positively associated with %β. LBMI was positively associated with 1st and 2nd insulin response, and negatively associated with MCR of glucose. LBMI explained 17% and 23% of the variation in insulin levels at PP (p=0.008) and 30 wks. (p=0.006). It also explained 15% and 23% of the variation of IR at PP (p=0.014) and 30 wks. (p=0.007). LBMI explained 23%, 15% and 27% of %β at PP (p=0.002), 10 (p=0.015) and 30 wks. (p=0.002). At 30 wks., LBMI explained 17% of variation in MCR (p=0.024) and 16% and 19% of the variation in 1st and 2nd phase insulin response (p<0.05).
Conclusions: PP LBMI was associated with higher insulin levels and an increased β-cell response before and during pregnancy in untrained women. PP LBMI is associated with lower glucose disposal at 30 wks. of gestation. Further studies of the impact of skeletal muscle quality on metabolic regulation during pregnancy are warranted.

T-OR-2010

Time Rrestricted Food Access Entrains Gastric Vagal Afferent Satiety Signals

Stephen Kentish *Adelaide* , George Hatzinikolas *Adelaide South Australia*, Hui Li *Adelaide SA*, Claudine Frisby *Adelaide SA*, Gary Wittert *Adelaide South Australia*, Amanda Page *Adelaide South Australia*

Background: Mechanosensitive gastric vagal afferents (GVAs) are part of a coordinated set of mechanisms involved in the regulation of food intake. GVAs exhibit circadian variation in their response to mechanical stimuli allowing time of day specific satiety signaling. This circadian variation is ablated by 12wks ad libitum access to a high fat diet (HFD). It is unclear whether the circadian pattern is entrainable to time restricted food access.
Methods: We fed 8wk old male C57BL/6 mice a standard laboratory diet (SLD; 18% kJ from fat,N=80) or a HFD (60% kJ from fat,N=80) ad libitum for 4wks, then each dietary group was divided so that half had access to food only during the light phase (LP: 07:00-19:00) or dark phase (DP: 19:00-07:00) for 8wks. From each group 8 mice were housed singly in metabolic monitoring cages to collect feeding data over the 12wks. Mice were then sacrificed at 3hr intervals from 07:00 and single fiber recordings from GVA tension and mucosal receptors were taken.
Results: HFD LP and DP mice weighed more than SLD LP and DP mice after 12wks, with no difference between LP and DP mice on the same diet. After 12wks, SLD DP mice consumed the greatest volume of food in 24hrs through a combination of increased meal number (relative to SLD and HFD LP mice) and meal size (compared to HFD DP mice). However, 24hr energy consumption was no different between SLD DP, HFD DP and HFD LP mice. In SLD and HFD DP mice, at 01:00 compared to 13:00 the response of tension receptors to 3g tension were reduced by 73% and 69% respectively. Mucosal receptor response to stroking (50mg) was reduced by 66% and 64% respectively. SLD and HFD LP fed mice showed reversed circadian rhythms with respective 78% and 59% reductions in the response to tension and 65% and 70% reductions in the response to mucosal stroking at 13:00 compared to 01:00.
Conclusions: Circadian rhythms in GVA satiety signals can be entrained to a period of food access to largely maintain caloric intake. This entrainment is unaffected by HFD feeding.

T-OR-2011

Characterization of Hypothalamic Gene Expression in a Rat Model of Roux-en-Y Gastric Bypass

Pernille Barkholt *Hørsholm DK*, Philip J. Pedersen *Hoersholm Denmark*, Kristoffer Rigbolt *HA,rsholm* , Anders Hay-Schmidt *Copenhagen Copenhagen*, Niels Vrang *Hørsholm Denmark*, Jacob Jelsing *Hørsholm N/A*

Background: Roux-en-Y gastric bypass (RYGB) promotes robust weight loss and resolution of type II diabetes. Here, we aimed at identifying adaptations in hypothalamic gene expression pattern of neuropeptides known to be involved in the homeostatic regulation of energy balance in a rat RYGB model.
Methods: Lean male Sprague-Dawley rats underwent either RYGB or SHAM surgery (n=9 per group). Body weight and food intake was monitored daily and animals were terminated 60 days post-surgery. Semi-quantitative in situ hybridization using 33P-labelled probes against AgRP, NPY, CART, POMC and MCH mRNA was applied to systematic uniform randomly sampled hypothalamic sections from RYGB and SHAM animals, as well as ad-libitum fed and food restricted Sprague-Dawley rats.
Results: RYGB led to a sustained 35% body weight loss compared with SHAM. Expression of the orexigenic AgRP and NPY mRNA was significantly upregulated in the arcuate nucleus (ARC) of RYGB rats (by 83% and 95% respectively) versus SHAM, whereas no changes were seen in the CART and POMC mRNA levels. A similar pattern was seen in food

restricted versus ad-libitum fed rats. In the lateral hypothalamus (LHA), expression of orexigenic MCH was upregulated in food restricted versus ad-libitum fed animals, whereas RYGB and SHAM showed equal levels MCH mRNA. **Conclusions:** Our findings indicate that RYGB rats exhibit a molecular signature of increase hunger-drive in the ARC, however, this signaling pathway is suppressed upstream at the level of the LHA, a key relay for control of food intake. In conclusion, suppressed appetite function in RYGB may be associated with uncoupling of hypothalamic orexigenic pathways.

T-OR-2012
Deletion of the Leptin Receptor on Vagal Afferent Neurons Alters Meal Patterns and Expression of the Estrogen Receptor in Female Mice

Charlotte Ronveaux *Davis California*, Helen Raybould *Davis CA*, Guillaume de Lartigue *New Haven CT*

Background: Signals from the gut act via vagal afferent neurons (VAN) to induce satiation and influence meal patterns. Meal patterns differ inherently between genders. Leptin and estrogen interact to regulate food intake; estrogen (ERα) and leptin (LepR) receptors are colocalized on VAN. We hypothesized that estrogen acting at ERα on VAN plays a role in inducing gender-specific differences in meal patterns. **Methods:** We used a conditional knockout mouse to delete LepR specifically from VAN (Nav1.8/LepR (fl/fl) mice; de Lartigue et al Mol. Met. 2014). Body composition, meal patterns, and inhibition of food intake in response to peripheral administration of cholecystokinin (CCK) and leptin were assessed in male and female Nav1.8/LepR (fl/fl) mice on a chow diet. ERα expression on VAN in female Nav1.8/LepR (fl/fl) and WT mice in the different phases of the estrus cycle was detected by immunofluorescence. **Results:** Nav1.8/LepR (fl/fl) mice have increased food intake, body weight, adiposity and a reduced response to CCK and leptin compared to WT, irrespective of gender. Weight gain was more rapid in female vs male Nav1.8/LepR (fl/fl) mice. Female WT mice ate longer and larger meals compared to male WT mice. Male Nav1.8/LepR (fl/fl) mice consumed longer and larger meals than WT mice, consistent with disruption of intestinal satiety signals; in contrast, female Nav1.8/LepR (fl/fl) ate smaller, shorter and more frequent meals compared WT females. ERα immunoreactivity was significantly decreased by 27% in female Nav1.8/LepR (fl/fl) compared to WT mice (p<0.05). ERα expression changed significantly according to phase of estrus cycle in female WT mice with higher expression during estrus; this was attenuated in Nav1.8/LepR (fl/fl) mice (p<0.05). **Conclusions:** Deletion of LepR on VAN changes meal patterns differently depending on gender and disrupts estrogen signaling, which may result in the gender-specific difference in feeding behavior.

T-OR-2013
Baseline mesolimbic and cognitive control circuitry activity predicts change in emotional eating behaviors post-surgery in vertical sleeve gastrectomy patients

Laura Holsen *Boston Massachusetts*, Paul Davidson *Boston MA*, Priyanka Moondra *Boston MA*, Florina Haimovici *Boston MA*, Vanessa Calderon *Boston MA*, A. Eden Evins *boston Massachusetts*, Jill Goldstein *Boston MA*, Luke Stoeckel *Boston Massachusetts*

Background: Emotional eating (EE) is implicated in weight loss maintenance efficacy following bariatric surgery. Baseline reward sensitivity and capacity to employ cognitive regulation strategies, and the neural and hormonal pathways guiding these, may be predictive of changes in EE post-surgery. **Methods:** The goal of this study was to investigate relationships between neural pathways associated with food craving and cognitive regulation and changes in EE and appetite peptides at 6 months post-surgery in vertical sleeve gastrectomy patients. Seven patients completed baseline (pre-surgery) and 6-month (post-surgery) follow-up visits. Both visits comprised a blood draw and EE assessment; the pre-surgery visit also included an fMRI scan with a food-related emotion regulation task with 2 strategies: upregulation of food craving and cognitive reappraisal. fMRI data were analyzed using SPM8 (p<0.05, FWE-corrected); contrasts: Upregulation>0; Reappraisal>0. **Results:** Greater pre-surgery activity in the ventral tegmental area (VTA) and medial orbitofrontal cortex (mOFC) during Upregulation>0, and in the dorsomedial prefrontal cortex (DMPFC) during Reappraisal>0, were related to lower attenuation of EE behaviors from pre- to post-surgery (VTA: r=-0.79, p=0.03; mOFC: r=-0.70, p=0.08; DMPFC: r=-0.73, p=0.06). Greater decrease in EE was also significantly associated with greater pre- to post-surgery decrease in acylated ghrelin (r=0.87, p=0.06). **Conclusions:** These results suggest unique coupling between baseline neural activity during up and downregulation of food craving and attenuation of maladaptive emotional eating behaviors post-surgery. Patients who demonstrated the greatest decreases in EE also showed the most significant decreases in ghrelin, which plays a role in reward signaling in mesolimbic regions. These preliminary data identify potential mechanisms driving successful outcomes post-surgery, and reveal pathways to target in novel treatments for those vunerable to post-surgical weight regain.

T-OR-2014
Brain Imaging Demonstrates Changes in Memory- As Well As Reward-Related Activation Greater Than One Year After Bariatric Surgery

Nancy Puzziferri *Dallas Texas*, Jeffrey Zigman *Dallas Texas*, Uma Yezhuvath , Sina Aslan *Frisco TX*, Carol Tamminga *Dallas Texas*, Francesca Filbey *Dallas TX*

Background: Women with severe obesity, before bariatric surgery, have neural responses postprandially which fail to attenuate compared to lean controls. We followed these women at 6- and >12-mo. after surgery to determine surgery-induced brain response to food cues in the fasted and fed states. **Methods:** 16 women undergoing gastric bypass or sleeve gastrectomy were scanned during a food task in fasted and fed states. Subjective hunger, and blood-oxygen-level-dependent functional MRI activation were measured. We analyzed differences across-state (fasted vs. fed) and over time (pre-versus 6- or 12-mo. post surgery) with t-tests, and factorial analyses. Tests were thresholded at uncorrected p-levels of 0.005 (cluster threshold > 20). **Results:** Seven gastric bypass and 9 sleeve gastrectomy women (mean BMI 43kg/m2; SD 4.8) provided post-surgery measures. Mean weight loss >12 mo. was 32.3 (SD 9.7). At 6-mo. post-surgery analyses indicated a time (pre-, post-surgery) x state (fasted, fed) interaction of greater neural response to food cues preoperatively in the fasted state in mesolimbic areas: striatum, orbitofrontal gyrus, medial prefrontal cortex,

hippocampus, amygdala, insula, anterior cingulate gyrus, ventral tegmental area and thalamus. At 12-mo. post-surgery changes in mesolimbic areas were similar to those at 6-mo. At 12-mo. post-surgery memory-related areas: amygdala, hippocampus, and middle temporal gyrus during the fed (vs. fasted) state increased. Subjective hunger was greater in fasted vs. fed states for all time points (p<0.001) and did not differ pre- to post surgery (state x time point; p=0.67).
Conclusions: Bariatric surgery attenuates neural response to food cues in the fasted and fed states relative to pre-surgery, and the difference between states is greater post surgery. Bariatric surgery-induced neural mechanisms underlying food cue response are measurable in reward-related regions at 6-mo. and also include memory-related regions at >12-mo.

T-OR-2015
GLP-1 Receptors Expressed on NTS Astrocytes Regulate Energy Balance

David Reiner *Philadelphia Pennsylvania*, Elizabeth Mietlicki-baase *Philadelphia Pennsylvania*, Lauren McGrath *Philadelphia PA*, Christopher Turner *Philadelphia PA*, Kieran Koch-Laskowski *Philadelphia PA*, Kendra Bence *Philadelphia Pennsylvania*, Gerlinda Hermann *Baton Rouge Louisiana*, Richard Rogers *Baton Rouge LA*, Matthew Hayes *Philadelphia Pennsylvania*

Background: Accumulating evidence indicates that the anorectic effects of glucagon-like peptide-1 receptor (GLP-1R) agonists are due in part to direct GLP-1R signaling in the central nervous system (CNS). A small body of literature has shown that GLP-1Rs are expressed on CNS astrocytes. Since astrocytes play a critical role in modulating extracellular glutamate, and the hypophagic effects of GLP-1R activation are partially mediated via glutamatergic signaling, we hypothesize that GLP-1R agonists act directly on astrocytes in feeding-relevant nuclei to regulate energy balance. The nucleus tractus solitarius (NTS) is the first CNS site to receive and process within-meal vagally-mediated glutamatergic signals arising from the GI tract; it also acts as a sensor for circulating endocrine factors and expresses GLP-1Rs. Therefore, we test the hypothesis that GLP-1R ligands act on astrocytes within the NTS to affect feeding and body weight.
Methods: First, the immortalized rat type-1 astrocyte D1-TNC1 cell line was treated with GLP-1R agonists (GLP-1, exendin-4 [Ex4] or liraglutide; 0.1-20nM) and cAMP signaling was assessed. Next, ex vivo live calcium signaling in NTS astrocytes was measured following bath application of Ex4 (100nM). Lastly, food intake and body weight of male rats was measured following NTS treatment with the astrocyte Krebs cycle inhibitor fluorocitrate (FC; 50mM) and Ex4 (0.05µg).
Results: In vitro analyses show that GLP-1R activation by all three GLP-1R ligands dose-dependently increased cAMP signaling in D1-TNC1 cells. Additionally, calcium imaging data show a prolonged activation in 36% of NTS astrocytes after Ex4, with a magnitude of response 90±12% of that evoked by ATP/glutamate. Preliminary behavioral data indicate that NTS pre-treatment with FC attenuated the 24h intake- and body weight-suppressive effects of NTS GLP-1R activation with Ex4.
Conclusions: Collectively, these data offer complementary evidence that GLP-1R signaling on NTS astrocytes affects energy balance control.

T-OR-2016
Preventing excessive gestational weight gain among African American women: a randomized clinical trial

Sharon Herring *Philadelphia Pennsylvania*, Jane Cruice *Phila PA*, Gary Bennett *Raleigh NC*, Marisa Rose *Philadelphia PA*, Adam Davey *Philadelphia PA*, Gary Foster *New York NY*

Background: Evidence is lacking regarding effective weight control treatments in pregnancy for ethnic minority women with obesity. This study evaluated whether a technology-based, behavioral intervention could decrease the proportion of overweight or obese African American women who exceeded the 2009 Institute of Medicine (IOM) guidelines for gestational weight gain.
Methods: We conducted a 2-arm randomized clinical trial. Participants were 66 socioeconomically disadvantaged African American pregnant women (12.5 ± 3.7 weeks' gestation; 36% overweight, 64% obese) recruited from 2 outpatient obstetric practices at Temple University between 2013 and 2014. We randomized participants to usual care (n = 33) or a behavioral intervention (n = 33) that promoted weight control in pregnancy. The intervention included: 1) empirically-supported behavior change goals; 2) interactive self-monitoring text messages; 3) biweekly health coach calls; and 4) skills training and support through Facebook.
Results: The intervention reduced the proportion of women who exceeded IOM guidelines compared to usual care (37.0% vs. 65.5%, p = 0.033; adjusted odds ratio: 0.3, 95% confidence interval [CI]: 0.10, 1.0, p = 0.0497). Intervention participants gained less weight during pregnancy (8.7 vs. 12.3 kg, adjusted mean difference -3.1 kg, 95% CI -6.2, -0.1, p = 0.045). No group differences in neonatal or obstetric outcomes were found.
Conclusions: The intervention resulted in lower prevalence of excessive gestational weight gain. Preventing excessive weight gain in pregnancy in this population may have significant public health implications for the prevalence of persistent obesity and obesity-related chronic disease – which could benefit both African American mothers and their offspring.

T-OR-2017
Does the Addition of Online Individual Motivational Interviewing Chat Sessions Enhance Weight Loss Outcomes in a Group-Based Online Weight Control Program?

Delia West *Columbia South Carolina*, Jean Harvey *Burlington VT*, Rebecca Krukowski *Memphis Tennessee*

Background: Online behavioral obesity treatment offers advantages in accessibility and cost, but weight losses are lower than those achieved with in-person programs. Incorporating motivational interviewing (MI) to face-to-face behavioral weight management significantly improves weight loss outcomes. The current study examines whether the addition of online MI chats to a web-based, group behavioral obesity treatment program augments weight loss outcomes relative to the web-based online weight control program alone.
Methods: Healthy overweight and obese subjects (N=398, 24% minority) were recruited from two sites (AR and VT) and randomized to: 1) an 18-month group internet behavioral weight control treatment (Internet) or 2) the same group internet treatment plus individual MI sessions (Internet+MI). Both conditions received weekly synchronous online chat group sessions for 6 months and 12 monthly group chats. Participants in both groups received identical behavioral

lessons and individualized therapist feedback on progress toward meeting exercise and calorie goals. Internet+MI also received 6 individual MI sessions delivered by a separate MI counselor via web chat. Weight was measured at baseline, 6 and 18 months.

Results: There were no significant differences in weight loss between Internet (-5.5 ± 6.0 kg) and Internet+MI (-5.1 ± 6.3) at 6-months or at 18-months (-3.3 ± 7.1 vs -3.5 ± 7.7 for Internet and Internet+MI, respectively). Attendance at group chats did not differ between groups, nor did self–monitoring patterns, suggesting comparable engagement in the weight control program in both conditions.

Conclusions: Outcomes with online group obesity treatment replicated earlier studies, confirming the potency of internet-delivered programs for producing clinically significant weight loss. However, adding MI to the group-based program did not improve weight loss induction or weight loss maintenance. Future research should continue to focus on strategies to enhance online weight control approaches.

T-OR-2018
Modulation in Eating Behaviors by Alternate Day Fasting Versus Daily Calorie Restriction: Impact on Weight Loss and Weight Maintenance Success

Cynthia Kroeger *Chicago Illinois*, John Trepanowski *Chicago Illinois*, Adrienne Barnoski *Wauwatosa WI*, Monica Klempel , Surabhi Bhutani *Madison Wisconsin*, Kristin Hoddy *Chicago Illinois*, Krista Varady *Chicago IL*

Background: Alternate day fasting (ADF; 75% restriction fast day alternated with 125% intake feed day) is effective for weight loss. What remains unknown, however, is how ADF impacts behavioral components of dietary intake, and how these modulations impact weight loss and weight maintenance. Accordingly, this study examined whether ADF improves eating behaviors (i.e. appetite ratings, dietary restraint, and self-efficacy) in a way that promotes successful weight loss and weight loss maintenance.

Methods: Obese subjects (n = 106) were randomized into 1 of 3 groups: 1) ADF, 2) calorie restriction (CR; 25% restriction daily), or 3) control, for a 24-week weight loss period. After weight loss, subjects began a modified ADF program (50% restriction fast day; 150% intake feed day) or CR-maintenance program (100% energy intake daily) for an additional 24 weeks.

Results: During the weight loss phase, percent energy restriction in both the ADF (21 ± 4%) and CR group (24 ± 4%) was close to the prescribed 25% level, with no differences between groups. Physical activity did not change between groups over the course of the trial. Body weight decreased (P < 0.001) in the ADF and CR groups (-5.7 ± 0.8 kg and -6.5 ± 0.9 kg, respectively) during the weight loss phase when compared to control. During the weight loss maintenance phase, body weight did not change for any group. When compared to the control group, there were no changes in appetite ratings (hunger, satisfaction, and fullness), dietary restraint, emotional eating, uncontrolled eating, or self-efficacy in either the ADF or CR group at any time point.

Conclusions: Findings from this study suggest that ADF is indeed an effective strategy for weight loss maintenance, but whether these effects are mediated by beneficial modulations in eating behaviors remains unclear.

T-OR-2019
Reaching Men with Weight Loss: Randomized Trial of the REFIT Program for Men

Melissa Crane *Chapel Hill North Carolina*, Lesley Lutes *Greenville North Carolina*, Dianne Ward *Chapel Hill North Carolina*, James Bowling *Chapel Hill North Carolina*, Deborah Tate *Chapel Hill NC*

Background: Despite the high prevalence of overweight and obesity among men, men are underrepresented in behavioral weight control programs. The purpose of this study was to test the efficacy of an Internet-delivered weight loss program designed to appeal to men as compared to a waitlist control group.

Methods: The REFIT (Rethinking Eating and FITness) program used a novel approach to weight loss, which included reducing calories by making six 100-calorie changes to diet per day, increasing physical activity, and using simplified self-monitoring. Participants self-selected specific diet strategies to change each week, increasing the personalization of the program. The program included weekly online contact for three months and monthly contact for three months. Assessments included objective measurement of weight and self-report use of recommended behaviors.

Results: Participants (N=107, 44.2±11.4 years, 31.4±3.9 kg/m2, 76.6% white) randomized into the study did not differ by group at baseline (p's > 0.05) nor by retention to the study (p=0.98; 90.1% retention at 6m). REFIT participants lost -5.0 kg (95% CI: -6.1, -3.9) at 3 months, which was maintained through 6 months (-5.3 kg, 95% CI: -6.5, -4.2); this was greater than change in the control group (p<0.001; 6-month: -0.6, 95% CI: -1.8, 0.5). More REFIT participants (49%) achieved a 5% weight loss as compared to the control group (19%; OR 9.4; 95% CI: 3.2, 27.4). Weight loss in the REFIT group was associated with the number of online contacts completed, self-reported frequency of making100-calorie changes to diet, using the simplified self-monitoring form, using a mobile application to track diet, and frequency of self-weighing (p's<0.05). REFIT participants completed 86.2% of online contacts and 95.7% reported they would recommend to a friend.

Conclusions: In a well utilized and positively evaluated men's weight loss program, adherence to recommendations was associated weight losses. The program was effective in producing clinically relevant weight loss.

T-OR-2020
Dietary lapses during behavioral weight loss: Characteristics and relationships with later success

Evan Forman *Philadelphia Pennsylvania*, Ross Crosby *Fargo ND*, Leah Schumacher *Philadelphia Pennsylvania*, Stephanie Goldstein *Philadelphia PA*, Meghan Butryn *Philadelphia PA*, Graham Thomas *Providence RI*, Emily Wyckoff *Philadelphia PA*, Stephanie Manasse *Philadelphia PA*

Background: Despite the central importance that dietary lapses play in weight loss failure, we know relatively little about their nature, how they combine with early weight loss to predict later weight loss success, what factors trigger them and how they change over time.

Methods: 190 participants entering a 25-session, 12-month behavioral weight loss program reported on potential lapse triggers (sight of food, boredom, emotion) as well as instances and characteristics of lapses using ecological momentary assessment (EMA) for 14 days at start, and 7 days at mid-point and end of treatment. The EMA protocol included 6 semi-

random prompts/day and event-contingent reporting.
Results: At baseline, participants reported M=4.45 (SD = 3.15) lapses/week, of which 44% were eating a food that hadn't been intended, 31% were eating at a time not intended, and 25% were eating a larger portion than intended. Most lapses occurred in the evening (53%) and most occurred at home (49%). Frequency of early lapses (r=.20, p <.01), and in particular eating at a time not intended (r=.27, p<.01) predicted end-of-treatment weight loss, even controlling for early weight loss (beta = .16, p<.05). Preliminary results indicate that boredom, fatigue and deprivation most strongly predicted lapses prospectively, and that lapse frequency was relatively stable from pre- to mid-treatment but increased by 10% between mid and end-of-treatment.

Conclusions: Results thus far offer a rare window into in-the-moment lapse behavior among those in a behavioral weight loss program, and suggest that interventions should attempt to prevent early lapse behavior (perhaps by targeting boredom) even among those whose weight loss is on track. Results also suggest that we could use early lapses to predict long-term outcomes, allowing for the development of tailored and sequenced treatment protocols. Increases in self-reported lapses may be due to more stringent lapse definitions and decreasing motivation.

T-OR-2021
Traffic-Light Labels at University Dining Halls
Michael Seward *Winchester Massachusetts*, Jason Block *Boston MA*, Avik Chatterjee *Cambridge Massachusetts*

Background: During college, many students make independent food choices for the first time, and they eat most of their meals on campus. We examined whether traffic-light labeling and choice architecture interventions could improve the dietary choices in college dining halls.
Methods: In 6 dining halls at one university in the northeastern US, we designed and implemented a 13-week intervention including traffic-light labels (red, yellow, green), choice architecture (make healthy items more accessible), and "healthy plate" tray stickers. During the 2014-15 academic year, 2 dining halls received all 3 interventions, 2 only received the choice architecture, and 2 dining halls served as controls. We collected sales of all food and beverage items during a 6 week period before the intervention and 7 weeks during the intervention. Using an interrupted time series analysis, we measured changes in proportions of red, yellow, and green items consumed per week. We also surveyed 779 students about the interventions.
Results: We labeled menu items 34% red, 21% yellow, and 45% green. We analyzed 2.6 million portions served over 13 weeks. Although we saw trends toward decreased consumption of red items (-0.8% change in sales per week, P=0.199) and increased consumption of green items (1.1% increase in sales per week, P=0.400) in intervention sites compared to controls, we found no statistically significant changes. Subgroup analyses of beverages, entrees, and hot food similarly showed trends toward dietary improvement, but no significant changes. Despite these findings, 58% of intervention students used traffic-light labels at least a few times per week, 60% thought they were helpful, and 73% of total respondents said they should continue to be used.
Conclusions: While many students reported regularly using the traffic-light labels and even more wanted the labels and plate stickers to remain in the dining halls, we did not find a

combination of these interventions to significantly change dietary choices of college students.

T-OR-2022
Evaluation of the CATCH Early Childhood Program for Obesity Prevention among Preschoolers in Texas: The TX CORD Study
Shreela Sharma *Houston Texas*, Courtney Byrd-Williams *Austin TX*, Elizabeth Vandewater *Austin TX*, Ru-Jye Chuang *Houston Texas*, Nancy Butte *Houston TX*, Deanna Hoelscher *Austin Texas*, Steven Kelder *Austin Texas*

Background: The Texas Childhood Obesity Research Demonstration (TX CORD) study was implemented to prevent childhood obesity among children ages 2 to 12 from low-income minority populations. As part of TX CORD, we evaluated the effects of the CATCH Early Childhood (CATCH EC) program on BMI, diet, physical activity and screen time behaviors of children ages 3 to 5 in Head Start centers.
Methods: Quasi-experimental study design with serial cross-sectional data collected from intervention and comparison catchment areas in Houston and Austin, TX (Intervention: n=17 Head Start centers, 843 parent-child dyads; Comparison: n=16 Head Start centers, 690 parent-child dyads). CATCH EC, a preschool-based nutrition and physical activity program, was implemented across the participating Head Start centers in the intervention areas while those in the comparison areas did usual program. Data were collected in 2012 (baseline, prior to CATCH EC) and 2014. Primary outcomes were child BMI percentiles, BMI z-scores using measured height and weight, and parent-reported frequency of intakes of fruits, vegetables, fried foods, sweets, sugary beverages, frequency of physical activity, and screen time. Mixed linear and logistic regression models were used to analyze intervention effects.
Results: At baseline, 36.7% of the preschoolers were overweight or obese; 72.9% were Hispanic, 21.8% African-American, and 5.3% other. Results showed significant decreases in BMI percentiles (p=0.044), decreased frequency of intake of sugary beverages (p=0.028), 100% fruit juice (p=0.028), eating dinner from a restaurant (p=0.006), and reduced screen time on weekends (p=0.050) among preschoolers attending Head Start centers in the intervention areas receiving CATCH EC compared to those in comparison Head Starts.
Conclusions: A primary prevention program can demonstrate positive effects on reducing obesity and promoting healthy behaviors among preschoolers from low-income minority populations.

T-OR-2023
Maternal Obesity and Early Childhood Development
Edwina Yeung *Bethesda Maryland*, Rajeshwari Sundaram *Rockville Maryland*, Yunlong Xie *Rockville MD*, Christopher Kus *Albany NY*, Germaine Buck Louis *Rockville MD*

Background: Over 20% of pregnant women in the United States are obese (BMI≥30 kg/m2). Few studies have examined the association between maternal obesity and early childhood development.
Methods: Upstate KIDS (2008-2010) is a population-based cohort which recruited mothers from New York State (excluding New York City) at 4 months postpartum. Mothers completed the Ages and Stages Questionnaire® (ASQ) when their children were 4, 8, 12, 18, 24, 30, and 36 months of age

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corrected for gestation. The ASQ is a validated screen designed to detect delays in 5 developmental domains (i.e., fine motor, gross motor, communication, personal-social functioning and problem solving ability). 3788 singletons and 2078 twins had information returned from one or more ASQs. Prepregnancy BMI was calculated using weight and height data from vital records. Odds ratios (aOR) and 95% confidence intervals (CI) were estimated using generalized linear mixed models adjusting for maternal age, race, education, insurance, cohabitation, prior live birth, pregnancy smoking, and paternal BMI. Analyses were stratified by plurality and correlations between twins were accounted for by clustering on family. Multiple imputations were used for missing paternal BMI data (n=515, 11%).

Results: The prevalence of prepregnancy obesity was 26%. Compared to normal (46%) or underweight (3%) mothers (BMI<25 kg/m2), children of obese mothers (BMI≥30) had increased odds of failing the fine motor domain whether a singleton (aOR 1.71; 95% CI: 1.14-2.61) or twin (2.10; 1.33-3.30). No other significant associations between the ASQ domains and maternal obesity were found among singletons. Among twins, maternal obesity was also associated with increased risk of failing the problem solving domain (1.78; 1.08-2.96). Removing paternal BMI from the model did not meaningfully alter results.

Conclusions: Screening by the ASQ suggested that fine motor development may be delayed among children of obese mothers compared to children of normal/under- weight mothers.

T-OR-2024
Food Security in Pregnancy and Infant Feeding at 3 Months

Meghan Mayhew *Durham NC*, Sara Benjamin Neelon *Durham NC*, Marissa Stroo *Durham NC*, Truls Ostbye *Durham NC*, Richard Kravitz *Durham North Carolina*, Gary Bennett *Raleigh NC*, Edwin Iversen *Durham North Carolina*, John Gallis *Durham NC*, Shayna Clancy *Durham NC*, Cathrine Hoyo *Raleigh NC*

Background: We evaluated food security in pregnancy and maternal infant feeding method and style at 3 months postpartum. We hypothesized that food insecurity would be associated with controlling feeding, and that this relationship would differ for women participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) or the Supplemental Nutrition Assistance Program (SNAP).

Methods: We studied 340 women recruited in pregnancy and followed until their infants were 3 months of age. We conducted logistic and linear regressions examining adjusted associations of food security in pregnancy with infant outcomes of breastfeeding (exclusive or partial) and feeding style (responsive, laissez-faire, pressuring, restrictive, and indulgent). We explored effect modification by modeling an interaction between food insecurity and WIC or SNAP participation.

Results: Food insecurity in pregnancy was not associated with breastfeeding at 3 months. Food insecurity was associated with a 0.25 point (95% CI 0.06, 0.44; p=0.01) increase in pressuring score, driven by the finishing (estimate 0.29; 95% CI 0.05, 0.53; p=0.02) and soothing (estimate 0.27; 95% CI 0.03, 0.50; p=0.03) sub-constructs. We did not observe differing effects of food insecurity by WIC or SNAP participation on breastfeeding (interaction p=0.07), but we did for the pressuring sub-construct soothing (interaction p=0.005). Food insecurity was associated with a 0.45 higher soothing score (95% CI 0.19, 0.71; p<0.001) for women participating in WIC or SNAP.

Conclusions: The pressuring feeding style and soothing sub-construct represent potential mechanisms linking food insecurity to obesity in early childhood. Our finding that WIC or SNAP participation was associated with higher soothing scores warrants further investigation.

T-OR-2025
Genetic Influence on Appetite Strengthens from Toddlerhood to Early Childhood

Clare Llewellyn *London London*, Moritz Herle *London London*, Jane Wardle *London London*

Background: Food responsiveness (FR) and satiety responsiveness (SR) are two key aspects of appetite hypothesized to play a causal role in the development of obesity. The relative importance of genetic and environmental influences on SR and FR in the post-weaning phase are unknown; and it is unclear if influences change once the transition to solid foods is established in early childhood. The aim of this study was to establish genetic and environmental contributions to FR and SR in toddlerhood and early childhood.

Methods: Data were from Gemini, a population-based sample of 2402 British twin pairs born in 2007. Parents completed the SR and FR scales of the Child Eating Behavior Questionnaire for each twin when they were 15 months and 5 years old. Longitudinal quantitative genetic modelling was used to estimate genetic and environmental contributions to SR and FR at 15 months and 5 years.

Results: SR and FR were moderately stable from 15 months to 5 years (SR: r=0.40, p<0.001; FR: r=0.42, p<0.001). Genetic influences increased significantly from 15 months to 5 years for both SR (15 months: 0.46 [0.42-0.50]; 5 years: 0.72 [0.68-0.76]) and FR (15 months: 0.41 [0.38-0.45]; 5 years: 0.61 [0.54-0.68]), while shared environmental contributions decreased significantly for both SR (15 months: 0.43 [0.47-0.48]; 5 years: 0.04 [0.01-0.09]) and FR (15 months: 0.50 [0.45-0.55]; 5 years: 0.28 [0.19-0.37]).

Conclusions: SR and FR are moderately stable from the post-weaning phase through to early childhood when eating behavior is more established. In line with many other behavioral traits, genetic influence on SR and FR increased substantially from toddlerhood to early childhood, while the impact of the shared environment diminished. Strengthening genetic effects may reflect increasing independence of children to act in line with their genetic predispositions towards food as they get older. Toddlerhood may offer an important window of opportunity for interventions to establish good appetite regulation.

T-OR-2026
Genetic and environmental influences on children's BMI trajectories from age 2 to 9 years

Jody Ganiban *Washington District of Columbia*, Samuel Simmens *Washington DC*, Jenae Neiderhiser *University Park PA*, Misaki Natsuaki *Riverside CA*, David Reiss *New Haven CT*, Daniel Shaw *Pittsburgh PA*, Leslie Leve *Eugene OR*

Background: Children's risk for obesity is shaped by genes, prenatal factors, and by their growth rate during early infancy. In most studies, however, these influences are confounded

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because parents control all three risk factors. The current study addresses this limitation by using an adoption design to disentangle the effects of genetic, prenatal, and postnatal risks on children's BMI trajectories.

Methods: Participants included 239 adoption triads (the adopted child (AC), Adoptive Mother (AM), and Birth Mother (BM)) from the Early Growth and Development Study. AMs' reports of children's weight and height at 2.25, 4.5, 5, 6, 7, and 9 years were used to compute BMI percentiles (BMIPCT) and assess changes over time. Genetic influences on AC's BMIPCT was assessed via BMs' reports of their prepregnancy BMI. AC's birth weight percentile was used as an index of fetal growth and nutrition. Change in AC's weight z-scores from birth to 9-months was used to index early growth rate, a known postnatal predictor of childhood obesity.

Results: Latent Class Growth Modeling identified 3 groups of ACs. Group 1 included 130 ACs who demonstrated healthy (intercept=68.25), but increasing BMIPCTs (slope=2.44). Group 2 included 62 ACs who demonstrated high-healthy (intercept=77.6) and declining BMIPCTs (slope=-6.7). Group 3 included 47 ACs with stable, low-healthy BMIPCTs (intercept=39.7). Birth Mother's prepregnancy BMI, AC's birthweight and early growth rate were associated with group membership. Children in Groups 1 and 2 tended to have Birth Mothers with higher BMIs and to demonstrate accelerated early growth, when compared to children in Group 3. Furthermore, children in Group 1 tended to have higher birth weights than Groups 2 and 3.

Conclusions: Analyses different patterns of BMIPCT change over time that were related to children's genetic makeup, fetal growth, and early postnatal growth rate. Furthermore, as illustrated by Group 1, heightened risks in all three domains predict increasing BMIPCT across childhood.

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T-OR-2027

Adipocyte Progenitors as Determinants of Adipose Tissue Remodeling in Obesity

Mikhail Kolonin *Houston Texas*, Zhanguo Gao *Houston TX*, Alexes Daquinag *Houtson TX*, Brad Snyder *Houston Texas*

Background: Overgrowth of white adipose tissue (WAT) is the hallmark of obesity. Thermogenic energy expenditure by brown adipose tissue counter-acts obesity and metabolic disease. Better understanding of the cellular processes controlling the balance of white and brown adipocytes is needed. Renewal of adipocytes relies on adipocyte progenitors. Recently, we demonstrated that pharmacological depletion of white adipocyte progenitors (WAP) in mice with a targeted pro-apoptotic peptide D-WAT suppresses obesity development. This indicates that WAP self-renewal and differentiation limits WAT expansion. Interestingly, WAP depletion resulted in recruitment of brown adipocyte progenitors (BAP), a distinct population of precursor cells that differentiate into brown adipocytes.

Methods: We have discovered that WAP and BAP can be identified as PDGFRα-PDGFRβ+ and PDGFRα+PDGFRβ-cells, respectively, in mouse WAT. Here, we investigated PDGFRα and PDGFRβ as markers of human BAP and WAP using specimens of subcutaneous and visceral WAT from patients undergoing bariatric surgery.

Results: Our data show that human PDGFRα-PDGFRβ+ cells and PDGFRα+PDGFRβ- cells comprise distinct WAT progenitor populations. Like in mice the PDGFRβ+ cells are

perivascular cells attached to the basement membrane, while PDGFRα+ stromal cells are located further away from the vasculature. Importantly, like in mice, human PDGFRα-PDGFRβ+ stromal cells, are specifically killed by D-WAT.

Conclusions: Our data indicate the presence of distinct progenitors populations maintaining white and brown adipocytes in humans. These results suggest that human adipose tissue composition could be pharmacologically modulated at the precursor cell level, which may have implications for the development of drugs enabling sustained obesity suppression and metabolism activation.

T-OR-2028

Senescent preadipocytes in obesity

Ana Espinosa De Ycaza *Rochester Minnesota*, Maria Morgan-Bathke *Rochester MN*, Barbara Carranza Leon *Rochester Minnesota*, Ian Lanza , Deb Harteneck *Rochester MN*, Michael Jensen *Rochester MN*

Background: Senescent preadipocytes are adipocyte precursors that have lost the ability to differentiate and replicate. Cell and animal models suggest an association between senescent preadipocytes, obesity and adipose tissue dysfunction. Our aims were to: 1) assess whether there are regional differences in adipose senescent cell populations; 2) evaluate the relationship between senescent cells and adiposity fat distribution in humans.

Methods: 49 overweight and obese adults (10 men) underwent body composition studies with DXA, abdominal imaging to measure visceral fat, and subcutaneous femoral (n= 31) and abdominal (n= 47) fat biopsies for fat cell size and senescent cells determination. Senescent cells were identified by senescence associated β-galactosidase staining and expressed as proportion of total number of nucleated cells (measured by DAPI staining).

Results: The median age and BMI were 35 years and 33.3 kg/m2, respectively. To our surprise, the proportion of senescent cells was 1.9 times greater in femoral than abdominal adipose tissue (AT) (4.2 % and 2.5 % respectively, p<0.001). There was a positive (spearman correlation rs= 0.66, p=0.003) relationship between abdominal and femoral senescent cells and between senescent cells and percent body fat (rs= 0.33, p=0.024 and rs= 0.47, p=0.0075 for abdominal and femoral senescent cells, respectively). This relationship persisted after adjusting for femoral fat cell size (p=0.003) but not for abdominal fat cell size (p=0.09). We found no correlation between senescent cells and visceral fat area, upper body subcutaneous fat or BMI in this overweight/obese population.

Conclusions: In overweight/obese men and women, femoral adipose tissue contains more senescent cells than abdominal fat; there is no detectable relationship between subcutaneous adipose senescent cells and visceral fat, but there is a relationship between senescent preadipocytes and adiposity; this relationship is stronger for femoral fat.

T-OR-2029

Diet-Induced Obese MMP-12 Deficient Mice Exhibit Impaired Total, M1, and M2 Adipose Tissue Macrophage Recruitment.

Alli Antar *Houston Texas*, C. Wayne Smith *Houston Texas*

Background: Throughout the progression of obesity, white adipose tissue (WAT) expansion is marked by WAT

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inflammation and the recruitment of leukocytes to WAT. Matrix metalloproteinase-12 (MMP-12) is a macrophage-secreted elastase that has been shown to play an important role in the degradation of elastin and other protein substrates, facilitating remodeling of tissue during the inflammatory response and the migration of leukocytes to sites of inflammation. MMP-12 expression in WAT is increased in diet-induced obesity.
Methods: In order to test the hypothesis that MMP-12 activity influences the recruitment of macrophages to expanding adipose tissue depots, we fed MMP-12 knockout (MMP12-/-) and wildtype (wt) littermate controls either low fat, low sucrose chow diet (CD) or high fat, high sucrose Western-type diet (WD) for 14 weeks.
Results: Although diet-induced weight gain and adiposity were not influenced by genotype on either diet, recruitment of total F4/80+, pro-inflammatory (M1) CD11c+, and alternatively activated (M2) CD301+ macrophages was significantly reduced in epididymal "visceral" white adipose tissue (eWAT) depots taken from WD-fed MMP12-/- mice in comparison with wt controls. Similarly, although adipocyte size did not differ between genotypes, numbers of crown-like structures in eWAT were also significantly reduced in WD-fed MMP12-/- mice relative to wt controls.
Conclusions: Our findings suggest that MMP-12 may play an important role in the recruitment of total, M1, and M2 macrophages to visceral WAT in the context of diet-induced obesity.

T-OR-2030
BET Proteins Regulate Inflammation in Obesity-Associated Breast Cancer
Guillaume Andrieu *Boston Massachusetts*, Katherine Strissel *Boston MA*, Gerald Denis *Boston MA*

Background: Obesity is a risk factor for cancer, but not all obesity types convey the same cancer risk. Metabolically-abnormal obesity (MAO) features chronic systemic and local inflammation of adipose tissue linked to breast cancer outcome. About 30% of obese women are metabolically healthy (MHO), low inflamed and with lower risks for cardiovascular disease and breast cancer. Reduced inflammatory signaling in the tumor microenvironment is likely a critical mechanism of protection. Small molecule inhibitors of BET (Bromodomain and Extraterminal) proteins with anti-cancer and anti-inflammatory properties have been reported. BET protein inhibition reduces inflammation and protect adipocytes from TNF-alpha-induced insulin resistance. Brd2-hypomorphic mice exhibit a MHO phenotype suggesting that BET proteins may couple obesity to metabolic disease. We hypothesized that BET protein inhibition reduces inflammation in breast adipose tissue and impairs breast cancer cell behavior. Thus, BET protein inhibition may break an obesity-cancer link in MAO-associated breast cancer.
Methods: Blood and breast adipose tissue samples were obtained from MAO and MHO patients. Conditioned media from isolated adipocytes or stromal-vascular cells or co-culture experiments were used to assay breast cancer cell proliferation, survival, migration and invasion.
Results: Human MHO abdominal fat had lower Brd2 expression than MAO. BET protein inhibition reduces inflammation in breast adipose tissue. BET protein targeting slows breast cancer cell proliferation and dramatically reduces migration and invasion stimulated by breast adipose tissue.
Conclusions: Our results suggest that BET protein inhibition

not only reduces tumor cell proliferation and invasiveness, but improves inflammation and metabolism in the breast cancer microenvironment. BET proteins regulate tumor-proximal adipocyte and macrophage properties, thereby modulating tumor aggressiveness, and must be considered as potential therapeutic targets in MAO-associated breast cancer.

T-OR-2031
Cellular Mediators and Inflammatory Cytokine Profile in Breast Adipose Tissue and Plasma Stratify Obese Phenotype of African American Women
Katherine Strissel *Boston Massachusetts*, Christopher Gromisch *Boston Massachusetts*, Guillaume Andrieu *Boston Massachusetts*, Gerald Denis *Boston MA*

Background: Crown-like structures(CLS)have been identified in human subcutaneous, visceral and breast adipose depots associated with both cardiometabolic and cancer risk. Our hypothesis was that measures of metabolic health in breast adipose tissue (AT)such as CLS, adipocyte size, and adipose stromal cell (SVC) phenotypes, would meaningfully associate with a pro-inflammatory imbalance of specific cytokines and adipokines in plasma of obese women.
Methods: Breast AT histological samples and matched plasma of obese/unhealthy African American (AA) women from the Komen Tissue Bank, the Black Women's Health Study and from elective breast reduction surgery patients were compared to matched obese/healthy subjects and to a matched lean/healthy cohort. CLS were quantified and adipocyte size determined. Breast AT stromal vascular fraction (SVC) of collagenase digested tissue were phenotyped by FACS. 41 plasma cytokines/adipokines were measured by multiplex assay.
Results: CLS were infrequent in breast AT. Thus far, 5 of 17 obese/unhealthy samples had CLS (none in metabolically healthy). Mean cell area was significantly larger in metabolically unhealthy subjects (4579.2 SD=713.2 micron, N=7, compared to 3231.9 SD=923.3 micron, N=10, P=0.004). A majority of pro-inflammatory cytokines trend toward increases with BMI. Non-biased computational analyses revealed cytokines and metabolic parameters stratify subjects to distinct groups. Phenotyping and analysis of breast AT immune cells are ongoing.
Conclusions: Cytokine expression patterns and measures of tissue immunometabolism were evaluated. We found that obese/healthy women can be resolved from obese/unhealthy as well as from lean and healthy, and that a limited number of cytokines/adipokines might be sufficient to begin to define risk cross-sectionally. The impact of our results is that the immunometabolic profile of patient plasma may provide a robust tool used to inform clinical outcomes for high risk patients. Supported by NCI: U01 CA182898

T-OR-2032
Disrupted adipose tissue homeostasis in obese adipocyte-specific OSMR knockout mice.
Carrie Elks *Baton Rouge Louisiana*, Peng Zhao *Ann Arbor MI*, Anik Boudreau *Baton Rouge LA*, Randall Mynatt *Baton Rouge LA*, Jacqueline Stephens

Background: Our recently published data demonstrate that oncostatin M (OSM), a gp130 cytokine, is produced by adipose tissue macrophages and highly up-regulated in obesity. In cultured adipocytes, OSM significantly decreases insulin

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sensitivity and up-regulates expression of pro-inflammatory and pro-fibrotic genes. Knockdown of the OSM-specific receptor (OSMR) prevents these changes. We hypothesized that adipocyte OSMR inhibition in vivo would also attenuate both insulin resistance and expression of pro-inflammatory and pro-fibrotic genes.

Methods: Gene and protein expression analyses were conducted on visceral adipose tissues from control and adipocyte-specific OSMR knockout (OSMR FKO) mice after 24 weeks of high-fat diet feeding.

Results: Our studies revealed increased macrophage and T-cell infiltration as well as increased pro-fibrotic and pro-inflammatory gene expression in OSMR FKO adipose tissue. As expected, adipose tissue OSM signaling, as judged by STAT3 phosphorylation, is substantially reduced in OSMR FKO mice. Targeted arrays revealed that the most highly up-regulated genes in OSMR FKO visceral fat were matrix metalloproteinase 7 and E-cadherin, two putative STAT3 target genes not normally considered to have major roles in adipose tissue.

Conclusions: Adipose tissue homeostasis in the OSMR FKO mouse may be regulated by genes not traditionally considered to affect adipose tissue function. Further studies are now underway to elucidate the importance of these genes in adipose tissue homeostasis and how their dysregulation may contribute to obesity.

T-OR-2033
The Relationship between Sugar-Sweetened Beverage Intake, Cortisol Response and Fat Partitioning

Grace Shearrer *Austin Texas*, Michael Goran *Los Angeles CA*, Donna Spruijt-Metz *Los Angeles California*, Marc Weigensberg *Los Angeles CA*, Jaimie Davis *Austin TX*

Background: Previous research has shown a correlation between cortisol activity and adiposity, specifically visceral adipose tissue (VAT). However, the effect of sugar-sweetened beverage (SSB) intake on cortisol and adiposity is unknown. Our objective is to examine the relationship between SSB intake, VAT, hepatic fat fraction (HFF), and cortisol response in minority youth.

Methods: A cross-sectional study with 82 overweight/obese African American and Hispanic adolescents (14-18 y) from the Oh My LA study conducted at University of Southern California with the following measures: VAT and HFF via MRI, cortisol awakening response (CAR) and morning cortisol (MC) via multiple salivary samples, and SSB intake via multiple 24-hour diet recalls. SSB intake was divided into the following: low (<0.5 serv/d), medium (0.5 to <1 serv/d), high (1 to <2 serv/d), and very high intake (≥ 2 serv/d). Multivariate analysis of variance was used to model the relationship between VAT, HFF, and CAR or MC (dependent variables) and SSB intake categories (independent variable) with the following a prior covariates: sex, tanner stage, ethnicity, caloric intake, and body mass index.

Results: Subjects with very high SSB intake compared to subjects with low SSB intake had 5% higher VAT (p<0.01), independent of covariates. Subjects with very high SSB intake compared to those with low SSB consumers had 16% higher MC (p<0.01) and 43% higher CAR (p<0.01) independent of adiposity and other covariates. The interaction between SSB intake and MC and SSB with CAR were both associated with VAT (p<0.01), (p=0.03).

Conclusions: High SSB intake appears to be related to higher VAT and higher cortisol response, independent of adiposity.

These findings suggest that SSB intake directly affects both adiposity and cortisol response in adolescents. This may suggest SSB and cortisol interact to influence fat partitioning in adolescents.

T-OR-2034
Identification of a Fatty Acid Binding Protein-UCP2 Axis Regulating Microglial Mediated Neuroinflammation

Cayla Duffy *Minneapolis Minnesota*, Ce Yuan *Minneapolis Minnesota*, Joshua Nixon *Minneapolis MN*, David Bernlohr *Minneapolis Minnesota*, Tammy Butterick *Minneapolis MN*

Background: Hypothalamic inflammation contributes to metabolic dysregulation and the onset of obesity. Dietary saturated fats activate microglia via an NFκB mediated pathway to release pro-inflammatory cytokines, resulting in dysfunction or death of surrounding neurons. Fatty acid binding proteins (FABP) are lipid chaperones regulating metabolic and inflammatory pathways in response to fatty acids. Although inhibiting FABP4 in peripheral macrophages results in reduced obesity-induced inflammation via a UCP2-redox based mechanism, the expression of FABP4 and a potential FABP4-UCP2 axis in microglia cells is largely uncharacterized. We hypothesized that microglial cells express FABP4 and that inhibition would up regulate UCP2 and attenuate lipopolysaccharide (LPS)-induced pro-inflammatory response.

Methods: Embryonic murine brain tissue and immortalized murine microglial cells (designated BV2) were evaluated for the presence of FABP4 by qRT-PCR. To assess the role of FABP4 in microglial inflammation, BV2 cells were pretreated in the presence or absence of a pan-FABP inhibitor (HTS01037; 30 μM) for 3h, and then treated with or without LPS (100 ng/ml) for 12h. Microglial cells were collected for qRT-PCR analysis of gene expression.

Results: Gene expression analysis reveals that embryonic mouse brain and BV2 cells express FABP4. Exposure of the FABP inhibitor HTS01037 in the presence or absence of LPS increased expression of UCP2 (p<0.0001 vs. control and LPS only) and arginase (p<0.05 vs. control and p<0.001 vs. LPS only). Moreover, cells exposed to HTS01037 exhibited attenuated expression of inducible nitric oxide synthase compared to LPS alone (p<0.0001) indicating reduced NFκB signaling.

Conclusions: To our knowledge, this is the first report demonstrating an FABP-UCP2 axis with the potential to modulate the microglial inflammatory response.

T-OR-2035
Simple Index of Insulin Secretion and Body Fat are Associated with Cognitive Decision-Making Measured by the Iowa Gambling Task

Douglas Chang *Phoenix AZ*, Marie Thearle *Phoenix AZ*, Susanne Votruba *Phoenix AZ*, Jonathan Krakoff *Phoenix AZ*, Marci Gluck *Phoenix AZ*

Background: Obesity and type 2 diabetes are risk factors for cognitive dysfunction. Obese subjects may perform worse than non-obese subjects on the Iowa Gambling Task (IGT), a test of decision making. Evidence has emerged for a role of brain insulin signaling on cognition, though the directionality of the association is inconsistent. We therefore evaluated anthropometric measures and indices of insulin action and secretion on IGT performance.

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Methods: IGT was administered to 196 non-diabetic adults (age: 35 years ±10 (mean ±SD)); male: 65%; education>12 years: 46%; BMI: 32±8 kg/m2, %fat: 36% ±12 by DXA) ~30 minutes after a standardized breakfast. All had a 75g oral glucose tolerance test to calculate the insulinogenic index at 30 min (ratio of insulin concentration at 30 min minus fasting insulin to difference of glucose at same time, IGI30). All subjects were healthy except for possible impaired glucose regulation (n=84).

Results: Fasting insulin, %fat, and IGI30 were correlated with poorer IGT scores (r=-0.20, p=0.004; r=-0.16, p=0.03; r =-0.25, p=0.0005, respectively). In a multivariate model adjusting for age, sex, race, and education, %fat (β=-2.53, p=0.030) and IGI30 (β=-51.26, p=0.010) were associated with IGT. An interaction between %fat and IGI30 was also observed (β=1.00, p=0.050), such that subjects with low IGI30 and low %fat had the best mean IGT score (12±27), those with high IGI30 with either high or low %fat had lowest scores (-3±19; -3±22, respectively), and those with low IGI30 and high %fat had an intermediate score (4±26).

Conclusions: Both greater adiposity and insulin secretion were independently associated with poorer decision making on the IGT. Our results indicate negative, additive effects of adiposity and insulin on cognition. The interaction between insulin and %fat on IGT may represent brain insulin-stimulated pathways under regulation by heterologous agents (e.g. tumor necrosis factor, free fatty acids) that are associated with body fat and are themselves regulated by insulin.

T-OR-2036
Dynamism of the Hypothalamic Transcriptome Uncovers "Stages" During the Development of Diet-Induced Obesity in Mice

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Background: Hypothalamus plays a central role in energy homeostasis. Although high-fat diet (HFD)-provoked hypothalamic injury has been implicated in leptin resistance, precise molecular mechanisms remain unveiled. Here, we dissected the transcriptomic changes in the three major energy centers of the hypothalamus: arcuate (ARC), paraventricular (PVN), and lateral (LH) nuclei, during the course of the development of diet-induced obesity.

Methods: ARC, PVN, and LH were micro-dissected from B6 mice fed either HFD or control low-fat diet (LFD) for 3 days, 2, 6 and 16 weeks, and transcripts were analyzed by RNA sequencing (n=3). We defined a transcript as an "Altered transcript" (AT) when the expression level under HFD was >1.5 or <1/1.5 fold of control and statistically significant (P<0.05). (1) Numbers of ATs counted, (2) ATs analyzed by cluster analysis, (3) Gene ontology (GO) assigned on each cluster, and (4) Upstream regulator (UR) analyzed using whole transcriptome data by IPA®.

Results: (1) Total numbers of transcripts included in ATs at one or more time points were 1486 (ARC), 1585 (PVN), and 1398 (LH). The number of ATs peaked at 6 weeks in ARC and LH, whereas at 3 days in PVN. (2) ATs in every nucleus were clustered into 5 groups: one with commonly downregulated transcripts throughout four time points, and the other four groups each consisting of transcripts specifically upregulated at only one time point. (3) GO terms assigned to each cluster were unique to the nucleus/time point combination. (4) On the

3rd day of HFD, three nuclei shared URs associated with cell cycle/proliferation. After 16 weeks of HFD, URs were commonly associated with inflammation.

Conclusions: We define "stages" of obesity by a specific group of upregulated hypothalamic transcripts that corresponds to a specific set of subcellular locations or molecular functions. Furthermore, earlier and later stages of obesity were characterized by cell cycle/proliferation and inflammation, respectively.

T-OR-2037
Proteoglycans of the Extracellular Matrix Influence Body Composition and Glucose Homeostasis During High Fructose Consumption

Emily Noble *Los Angeles California*, Qingying Meng *Los Angeles CA*, Zhe Ying *Los Angeles CA*, Fernando Gomez-Pinilla *Los Angeles California*, Xia Yang *Los Angeles CA*

Background: Fructose consumption has been identified as a main contributor to the current epidemic of metabolic disorders. The brain plays an important role in the regulation of whole body energy balance and glucose homeostasis, yet surprisingly little is known about how fructose affects the brain. Using a systems genomic approach to integrate brain gene regulatory networks constructed from multiple rodent populations, we derived hypothalamic gene networks to identify interactions among genes affected by a high fructose diet. Through these analyses, the biglycan gene (BGN) emerged as a central node in the network of fructose-affected genes. BGN is a small leucine rich proteoglycan found in the extracellular matrix, which is known to bind and modulate the activity of growth factors, such as TGFβ. We hypothesized that BGN plays a key role in mediating fructose-induced metabolic disease.

Methods: BGN knockout mice (BKO) or wild type litermates (WT) were fed either fructose solution (15% w/v) or regular water for 10 weeks. Body weight, body composition, plasma lipids and glucose clearance were our primary endpoints. Using a combination of immunoblotting and immunohistochemical analyses, we further analyzed the activity of central transforming growth factor TGFβ receptor-1, which promotes hyperglycemia and glucose intolerance.

Results: BKO mice were heavier than controls, mainly due to elevated lean mass (p<0.001). During the fructose intervention, BKO mice continued to gain weight as lean mass, and were protected against fructose effects to increase body fat %. BKO mice had improved glucose clearance, but total cholesterol and triglycerides were elevated and liver sizes were enlarged. BKO mice had reduced phosphorylation of TGFβ receptor-1 in brain.

Conclusions: These data support a role for biglycan as a contributor to fructose-induced glucose regulatory aberrations and highlight the importance of the extracellular matrix in mediating aspects of diet-induced metabolic disease.

T-OR-2038
Neurochemical Characterisation of the Sympathetic Neural Input to 'Beige' Fat Cells

Brian Oldfield *Clayton VIC*, Nicole Wiedmann *Monash University Victoria*, Aneta Stefanidis *Clayton Vic*

Background: One of the most intriguing recent developments in the already exciting field of brown fat biology is the potential to recruit functionally active 'beige' fat. We have

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recently shown that coincident with exposure of rats to cold (8 degrees C) and the subsequent increased formation of beige fat cells in rat inguinal white adipose tissue (iWAT). There is an increase in central neural input specifically to this fat pad. In order to gain an appreciation of the neurotransmitters and other elements that directly control brown fat function we have focused on the T13/L1 sympathetic ganglia that provide the sympathetic outflow to iWAT.

Methods: In order to identify synaptically-connected neural input to beige iWAT, the neurotropic tracer PRV614 was injected into iWAT of rats housed at 8 and 27 degrees C for 1 week. Other rats kept under these same conditions were perfused under saline and the T13/L1 ganglia removed for RNA extraction and subsequent RNA-seq using Illumina HiSeq1500 with approx 25 million reads. Comparison was made between T13/L1 ganglia under each temperature condition using quantified normalised expression values for mRNA in each sample.

Results: Following injection of PRV614 into iWAT there was no difference in numbers of neurons in T13/L1 in rats exposed to either temperature; however, there were increased numbers of neurons directed to iWAT at supraspinal levels when exposed to cold. RNA-seq analyses comparing mRNA and gene expression profiles between ganglia projecting to iWAT and beiged iWAT yielded a unique set of candidates representative of a neurochemical signature of the innervation of beige fat.

Conclusions: These data provide the first insight into the neurochemical profile of the innervation of beige fat. Such observations are fundamental to the identification of elements that may be modified in order to specifically recruit beige fat, increase energy expenditure and potentially reduce body weight.

T-OR-2039

Promoting healthful family meals to prevent childhood obesity: HOME Plus, a randomized controlled trial

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Background: In spite of the strong correlational evidence suggesting the importance of family meals, there have been very few evaluations of family meals-focused interventions, and none of these have utilized randomized controlled trials (RCTs) to examine impact on obesity in youth. This presentation will describe weight-related outcomes of the HOME Plus study, the first family meals-focused RCT to prevent excess weight gain among youth.

Methods: Families (n=160 8-12-year-old children and their parents/guardians) were randomized to intervention (n=81) or control (n=79) groups. Data were collected at baseline (2011-2012), post-intervention (12-months post-baseline) and follow-up (21-months post-baseline). The intervention included ten monthly group sessions (nutrition education; hands-on meal and snack planning, preparation, and skill development; screen time reductions) and five motivational, goal-setting phone calls. The main outcome was child body mass index (BMI) z-score.

Results: General linear models, adjusted for baseline values and demographics, showed no significant treatment group differences in BMI-z-scores at post-intervention or follow-up;

however, a promising reduction in excess weight gain was observed. Post-hoc stratification by pubertal onset indicated prepubescent children in the intervention group had significantly lower BMI-z-scores than their control group counterparts.

Conclusions: The study used a strong theoretical framework, rigorous design, quality measurement and a program with high fidelity to test a family meals-focused obesity prevention intervention. It showed a modest decrease in weight gain. The significant and provocative intervention effect among prepubescent children suggests the intervention may be more effective among relatively young children.

T-OR-2040

Effects of Interrupting Sedentary Behavior with Short Bouts of Moderate Physical Activity on Glucose Tolerance in Healthy Children: A Randomized, Crossover Trial

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Background: Limited data suggest interrupting sedentary behavior (SB) with physical activity (PA) improves metabolic parameters in adults. We tested if interrupting sitting with bouts of moderate PA would improve glucose tolerance in children.

Methods: In this cross-over study, normal weight (N=28; 54% male; 61% white) 7-11 year old children underwent 2 experimental conditions in random order on different days: continuous sitting (3 hours sitting) or sitting interrupted by walking breaks (3 min moderate-intensity walking (80% of anaerobic threshold) every 30 min). Insulin, C-peptide, and glucose were measured every 30 min for 3 hours during an oral glucose tolerance test, and area-under-the-curve (AUC) was calculated for each. Children were given a 9800 kcal buffet meal following each experimental condition. Anxiety, affect, and cognitive function (working memory, attention/inhibition) were assessed at post-test. Paired t-tests assessed differences in AUC, energy intake, anxiety, affect, and cognitive function. Mixed models assessed changes in insulin, C-peptide, and glucose over 3 hours.

Results: Interrupting sitting resulted in a 32% lower insulin AUC (p<0.001), 17% lower C-peptide AUC (p<0.001), and 7% lower glucose AUC (p=0.02) vs. continuous sitting. Mixed model results found that insulin secretion over the 3 hour tests were significantly lower in the interrupted vs. the continuous sitting condition (p<0.001). Subsequent energy intake, anxiety, affect, or cognitive function did not differ by condition.

Conclusions: Interrupting SB with brief moderate-intensity walking breaks improved short-term metabolic function in non-overweight children, likely by increasing glucose effectiveness, without increasing subsequent energy intake. These findings suggest interrupting sedentary time with activity breaks may be a promising intervention strategy for reducing cardiometabolic risk in children. Future studies that investigate the longer-term metabolic effects of interrupting sitting are warranted.

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T-OR-2041

A Parenting Intervention in the First Year after Birth Impacts Feeding Practices and Styles Related to Child Obesity Risk

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Background: What, when, how much, and how often foods are fed as well as bottle feeding practices have been associated with childhood obesity risk. In addition, nocturnal feeding has been associated with shorter sleep duration, another risk factor for overweight.
Methods: The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) study is an ongoing randomized, controlled trial where a parenting intervention designed to prevent childhood obesity is being compared with a safety control group. Primiparous mother-newborn dyads (n=291) were recruited and randomized 2 weeks after birth. The responsive parenting curriculum was delivered at nurse home visits 3, 16, 28 and 40 weeks after birth. Infant feeding practices were assessed by phone interviews at 8, 20, and 32 weeks. The Infant Feeding Style Questionnaire (IFSQ) was assessed at 28 weeks.
Results: Mothers in the parenting group reported fewer night time feedings at 20 and 32 weeks (p<0.01) and feeding fewer snacks at 32 weeks (p<0.05). Parenting group mothers introduced solid foods later (p<0.05) and were more likely to introduce vegetables as the first solid food compared to safety mothers (p<0.01). At 1 year of age, children in the parenting group were less likely to be using a bottle (p<0.05). Lastly, mothers in the parenting group reported lower pressuring to eat scores (i.e, pressuring to finish, pressuring with cereal, pressuring as soothing) compared to safety group mothers (p<0.001).
Conclusions: This behavioral intervention was successful at impacting parent feeding practices during infancy that influence obesity risk.

T-OR-2042

Effect of Changes in Time in Bed on Children's Eating Behaviors

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Background: Adult experimental studies demonstrate that short sleep may affect obesity risk via changes in food intake, particularly for energy-dense snack foods. Our experimental study with school-aged children demonstrated that compared to a rested condition, sleep restriction was associated with a reported 134 kcal/day increased intake, but no difference in macronutrients; children weighed 0.2 kg more. The purpose of the present work is to determine whether changes in specific eating behaviors, particularly increased energy-dense snack foods and beverages, account for reported change in kcal intake.
Methods: Using a within-subject, crossover design, 36 children 8-11 years (mean=9.6+/-1.0); 20 boys; 81% nonHispanic White; mean BMI percentile=54.9+/-27.6) who reported sleeping 9.5 hrs/night completed the study. Children first slept their typical amount for 1 wk and were then randomized to increase (INC) or decrease (DEC) time in bed (TIB) by 1.5 hrs/night for 1 wk (& completed the alternate the last wk). All wks children wore actigraphs, completed sleep diaries, and 3 day 24-hour dietary recalls (variables of interest include kcal/day of: energy-dense snack foods (EDSF), sweetened beverages (SB), fruits and vegetables). No order effect was detected; bivariate correlations and paired t-tests were used. Data was transformed given non-normality of distributions.
Results: Children reported greater kcal consumption of SBs during DEC (129+/-119) than INC (98+/-89) (t=2.19, p=.04). There were no reported differences in EDSF, fruits or vegetables. Reported kcal intake in each category was moderately/highly correlated in the INC and DEC conditions: EDSF (r=.54, p=.001); SB (r=.71,p<.001); fruit (r=.76,p<.001); vegetables (r=.62, p<.001).
Conclusions: Findings underscore that increased caloric intake due to short sleep may be due, in part, to increased sweetened beverage intake(e.g., caffeinated drinks). This may be particularly problematic for weight regulation given lack of compensation for liquid kcal intake.

T-OR-2043

Translating Basic Behavioral Science of Learning and Motivation into an Adaptive Community-Based Obesity Treatment for African American Adolescents

Sylvie Naar-King *Detroit MI*, Deborah Ellis *Detroit MI*, Angela Jacques-Tiura *Detroit Michigan*, April Carcone *Detroit MI*, Kathryn Brogan Hartlieb *Miami FL*

Background: African American adolescents are disproportionately affected by obesity, and the few trials focusing on this group have had limited success.
Methods: In a sequential multiple assignment randomized trial, 181 youth ages 12 to 16 years with primary obesity and their caregiver were first randomized to 3 months of home-based versus office-based delivery of motivational interviewing (MI) plus skills building. After 3 months, non-responders to first phase treatment were re-randomized to continued home-based skills or contingency management. Primary outcome was percent overweight and hypothesized moderators were adolescent executive functioning, the relative reinforcing value of food.
Results: There were no significant differences in primary outcome between home-based or office-based delivery or between continued home-based skills or contingency management for non-responders to first-phase treatment. However, families receiving home- based treatment initially attended significantly more sessions in both phases of the trial, and families receiving contingency management attended more sessions in the second phase. Overall, participants demonstrated decreases in percent overweight over the course of the trial, and adolescents with higher executive functioning and lower RRV lost more weight and improved metabolic syndrome risk factors in certain sequences.
Conclusions: Home based treatment and CM increase session attendance for in AA youth, but more potent obesity interventions are needed. Future directions include a basic behavioral science study underway to understand the relationship between RRV, executive functioning, fMRI and food and activity choices in this group and the development of PA interventions to improve executive function and metabolic syndrome outcomes.

T-OR-2044
Childhood Obesity Preventive Intervention Improves Infant Sleep Duration and Sleep Hygiene
Jennifer Savage , Stephanie Anzman-Frasca *Boston MA*, Michele Marini *University Park PA*, Jodi Mindell *Philadelphia Pennsylvania*, Leann Birch *Athens Pennsylvania*, Ian Paul *Hershey PA*

Background: The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) study is an ongoing randomized, controlled trial comparing a responsive parenting intervention designed to prevent childhood obesity with a safety control. The parenting intervention has been shown to protect against faster weight gain during the first 6 months after birth. This analysis examines the effect of this parenting intervention on infant sleep hygiene and duration which have been associated with childhood obesity.
Methods: Primiparous mother-newborn dyads (n=291) were recruited and randomized 2 weeks after birth. Parenting and safety curricula were delivered via nurse home visits 3, 16, 28 and 40 weeks after birth. The parenting intervention used a responsive parenting framework with obesity prevention messages that correspond to infant/toddler behavior states and included a sleep curriculum. Mothers completed online surveys about infant sleep at 8, 16, and 40 weeks.
Results: Parenting group infants slept longer at night than control group infants at 8, 16 and 40 weeks (p<.05); effect did not vary by feeding mode. Parenting group mothers were more likely to put their baby to bed by 8 PM (p<.001) at 16 and 40 weeks, swaddle their infant at night at 16 weeks (p<.01), and use white noise at bedtime at 40 weeks (p<.05). At 16 and 40 weeks, parenting group infants were more likely to sleep in a crib in their own room (p<.05). At 40 weeks, more parenting group mothers allowed their infant to self-soothe to sleep (fall asleep in crib) (p<0.05), while more safety group infants fell asleep while being held and/or bottle fed (p<0.05). For night awakenings at 40 weeks, safety group mothers were more likely to rock and/or feed their child back to sleep (p<.05 for both).
Conclusions: This responsive parenting intervention improved sleep hygiene and duration, factors that have been associated with childhood obesity.

T-OR-2045
Prediction of Percent Body Fat Measurements in Americans 8 Years and Older
June Stevens *Chapel Hill North Carolina*, Fang-Shu Ou *Chapel Hill NC*, Jianwen Cai *Chapel Hill NC*, Steven Heymsfield *Baton Rouge Louisiana*, Truesdale Kimberly *Chapel Hill NC*

Background: Equations for the prediction of percent body fat (%BF) are usually developed in narrowly defined groups and therefore limited in generalizability. The few equations that have been developed using a nationally representative sample studied less than half of the available anthropometrics and targeted either children or adults.
Methods: We randomly selected ¾ of 21,099 participants aged 8 years and older from the 1999-2006 NHANES to generate equations for the prediction of %BF. DXA assessed %BF was used as the response variable for development of 14 equations for each gender that included demographics and between 2 and 10 anthropometric measurements. Linear, non-linear and interaction terms were studied, and between 16 and 52

mathematical terms were selected for inclusion using the Least Absolute Shrinkage and Selection Operator (LASSO). Equation performance was evaluated in ¼ of the sample reserved for internal validation by examining R^2 and systematic under or over estimation (mean signed difference (MSD)).
Results: In the final models R^2 ranged from 0.664 to 0.845 in males and from 0.748 to 0.809 in females. R^2 was not improved by development of equations within, rather than across, age and ethnic groups. Three models under-estimated %BF in underweight males, but otherwise bias was within acceptable limits across BMI, age (adult/youth) and ethnic (white, black, Mexican American) subgroups. Seven of the 14 gender-specific models showed low bias and had R^2 values above 0.80 in males and 0.795 in females.
Conclusions: Use of the LASSO technique to select terms for the prediction of %BF was novel and facilitated the testing of a large number of candidate terms for selection of complex models. To our knowledge these are the first equations for the prediction of %BF that are valid and unbiased over such a wide range of ages and ethnicities and are generalizable to the US population. We hope that these attributes will lead to wide-spread use by obesity researchers.

T-OR-2046
The Validity of Using Early First Trimester Weight as Pregravid Weight
Rebecca Krukowski *Memphis Tennessee*, Delia West *Columbia SC*, Marisha DiCarlo *Little Rock AR*, Kartik Shankar , Aline Andres *Little Rock AR*

Background: Obtaining an accurate and proximal pregravid weight is a challenge, as many pregnancies are not planned and the amount of time between deciding to conceive and actual conception is variable. Having an accurate and proximal pregravid weight is important to determine the appropriate Institute of Medicine gestational weight gain range, and it is not clear whether an early first trimester weight is a good proxy for pregravid weight.
Methods: Under identical conditions with a calibrated scale, a pregravid weight and two weights during the first trimester (i.e., 4-10 weeks gestation and 12 week gestation) were obtained on 55 participants (93% Caucasian, mean (SD) age= 29.44(3.51) years, 51% overweight/obese). At the pre-pregnancy visit, participants were advised to remain weight stable during the first trimester. The 4-10 week weight was obtained, on average, at 5.65 weeks.
Results: Pregravid and 4-10 week weight were highly correlated (r=0.99, p<0.0001), controlling for the time interval between the visits. The mean weight gain from the pregravid visit to 4-10 week visit was 0.77 (1.91) kg over an average interval of 139 days. There were no significant differences in weight change between the normal weight (mean=+0.53 kg (1.66)) and overweight/obese women (mean=+1.01 kg (2.13), p=0.36). Overall, 50 women (91% of the sample) were classified in the same BMI category based on their pregravid and 4-10 week weights. Four of the five participants who changed BMI category experienced a weight gain. Using the 12-week weight resulted in 8 participants changing BMI category and a slightly lower correlation between pregravid and 12 week weight (r=0.96, p<0.0001).
Conclusions: Pregravid weight and first trimester weight were highly correlated, and few participants in this sample would have been assigned an inaccurate weight gain goal, particularly at 4-10 weeks gestation; thus, it may be appropriate to assign

gestational weight gain guidelines based on an early first trimester weight.

T-OR-2047
Use of Self-Reported Height and Weight in the Prediction of Body Mass Index in Longitudinal Studies of Young Adults
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Background: In longitudinal cohort studies and trials, missing BMI data at follow-up is often imputed using BMI constructed from measured height and weight from a prior examination. BMI derived from self-reported height and weight relevant to the time of follow-up is rarely used despite its strong correlation with BMI derived from measured anthropometry. We compared the performance of BMI measured at the prior examination and BMIself-reported at follow-up for the prediction of BMI at follow-up.
Methods: Data from 11,008 participants at Wave III (2001-2002, aged 18-26 years) and Wave IV (2007-2008, aged 24-32 years) in the National Longitudinal Study of Adolescent to Adult Health study were randomly divided into 5 sets of training datasets (80%) and the testing datasets (20%). In a single home-based interview at each Wave, participants self-reported their height and weight and were measured subsequently by a technician. We developed 2 models for the prediction of BMI measured at Wave IV respectively using BMI measured at Wave III and BMI self-reported at Wave IV in the training dataset. In the testing dataset, R^2 and root mean square error (RMSE) were obtained by regressing BMI measured at Wave IV on its predicted values. Bias was calculated as the mean of predicted minus BMI measured at Wave IV. Differential bias was calculated as bias in normal weight group minus bias in obese group.
Results: In the testing dataset, the Wave IV BMI self-reported model produced a larger R^2 (0.91 vs. 0.69), smaller RMSE (2.1 vs. 3.8 kg/m^2) and differential bias (1.0 vs. 4.2 kg/m^2) compared to the Wave III BMI measured model. Adding demographics, BMI self-reported and BMI measured at Wave III, and perceived weight status at Wave IV to the Wave IV BMI self-reported model resulted in less than 0.01 of increase in R^2.
Conclusions: Our study indicated that investigators should consider collection of self-reported height and weight to help in the imputation of missing BMI in longitudinal studies.

T-OR-2048
Evaluation of Novel Estimations of Energy Intake Based on Energy Balance
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Background: Assessments of energy intake (EI) are frequently adversely affected by measurement error. Recently, a simple equation has been developed and validated to estimate EI based on the energy balance equation (EI= energy storage + energy expenditure). Our goal was to compare multiple estimates of EI, including two calculated from the energy balance equation.
Methods: Body composition of participants (N=195, mean age= 27.9 years, 46% female) was measured at the beginning and end of a two-week assessment period using dual-energy X-ray absorptiometry. Resting metabolic rate (RMR) was measured by indirect calorimetry. Energy expenditure (EE) was assessed using the doubly-labeled water technique and an arm-based activity monitor (Sensewear® Mini, SWA). Self-reported EI was calculated using dietician-administered 24-hour dietary recalls (three days, including at least one weekend day). Two estimates of EI were calculated using a validated equation: changes in fat mass and fat-free mass occurring over the assessment period, plus EE from either DLW or SWA. To compare estimates of EI, reporting bias ((estimated EI – EE from DLW)/EE from DLW x 100) and Goldberg Cut-offs (estimated EI/RMR) were calculated.
Results: Mean±SD EE from DLW and SWA was 2731±494 and 2729±559 kcals/day, respectively. Self-reported EI was 2113±638 kcals/day, EI derived from DLW was 2723±469, and EI derived from SWA was 2720±730. Reporting bias for self-reported EI, DLW EI, and SWA EI are as follows: -21.5±22.2%, -0.7±18.5%, and 0.2±20.8%, respectively. Goldberg Cut-offs for self-reported EI, DLW EI, and SWA EI are as follows: 1.39±0.39, 1.77±0.38, 1.77±0.38, respectively.
Conclusions: These results suggest that estimates of EI based on the energy balance equation can provide reasonable estimates of group mean EI. When EE derived from DLW is not feasible, an activity monitor that provides a valid estimate of EE can be used to estimate EI with similar results.

T-OR-2049
Comparing the Predictive Ability of Two Comprehensive Clinical Staging Systems: Edmonton Obesity Staging System (EOSS) and Cardiometabolic Disease Staging (CMDS)
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Background: While body mass index (BMI) has been used as a guide for treating and screening excess adiposity, its limitation in the clinical-setting as the only screening tool for obesity treatment is widely accepted. Two alternative clinical staging systems were proposed in recent years: Edmonton Obesity Staging System (EOSS) and Cardiometabolic Disease Staging (CMDS). Both of these are superior to BMI because they include assessment of obesity-associated medical and functional conditions. However, it is unclear which of these two staging systems have a greater ability in predicting mortality.
Methods: In this study we tested for differences in the ability of EOSS and CMDS to accurately predict mortality. We compared the predictive ability of EOSS and CMDS using data from National Health and Nutrition Examination Survey III (NHANES IIII) with corresponding mortality follow-up data through to the end of 2006. First, we identified individuals in NHANES III who participated in the morning examination session and restricted our analytic sample to this group. Second, we used Cox regression models developed and published for EOSS and CMDS and estimated respective R2s as a measure of predictive accuracy. We generated a 95% percentile based bootstrap confidence interval for the differences in the respective R2s by creating 1000 sets of bootstrap samples. These analyses were done separately for adults aged 20 to 39 and aged 40 to 74 respectively.
Results: The 95% confidence interval estimates for the

differences in R2 for adults aged 20 to 39 were 0.00210 (-0.0068, 0.0130). The 95% confidence interval estimates for the differences in R2 for adults aged 40 to 74 were -0.0069 (-0.0258, 0.0110).
Conclusions: Our results suggest that across both age groups there is no statistically significant difference in the predictive ability of EOSS and CMDS when predicting mortality. Further, research would include testing for differences in the predictive and discriminative ability using other measures.

T-OR-2050
Trends in Appetite for Policy Change for Obesity Prevention: Canadian Views 2009-2014
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Background: As increasing evidence links rates of obesity to changes in environments, the development of healthy public policy has been identified as a key intervention strategy. Our objective was to identify readiness for policy change among key policy-influencers, identify strategies for advocacy, and monitor trends in appetite for policy change over time.
Methods: In 2009, a survey was developed to assess the acceptability of policy actions to prevent obesity among key policy influencers in Alberta and Manitoba, Canada. Surveys were mailed to census samples of key influencers from government, school boards, print media, and large workplaces. Following two years of policy advocacy in Alberta, post-surveys were administered in 2011. Differences between Alberta and Manitoba (control) enabled assessment of the impact of advocacy. Inferentially, cross tabulations with 2-sided exact chi-squared statistics were used to assess provincial differences. The survey was repeated in 2014 (Alberta only) and descriptive statistics were used to assess trends in policy support.
Results: Baseline surveys revealed almost universal support for individually-focused policies (e.g. public education campaigns, school nutrition and physical education curricula) in both provinces, but lower support for economic policies (e.g. taxing unhealthy foods and beverages)and legislative changes (e.g. zoning by-laws to restrict fast food outlets or vehicle traffic). In 2011, non-significant trends showed increasing support for almost all policy options in Alberta, with little change in Manitoba. Over 5 years, support for all policy options increased in Alberta, with some policies achieving over 10% increase in support (e.g. prohibit advertising of unhealthy food to youth, mandatory calorie listing in restaurants, monetary incentives for physical activity participation).
Conclusions: Positive trends in support suggests public policy for obesity prevention is a promising intervention. The role of advocacy in increasing support holds potential.

T-OR-2051
SSB taxes in preschool children and associated changes in 2010 Healthy Eating Index score
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Background: Placing taxes on sugar-sweetened beverages (SSBs) has been proposed as a strategy to combat child obesity. Yet, it is unclear how a tax on SSBs might influence the overall diet quality of preschool children. To explore the

relationship between SSB taxes and diet quality in preschool children, we examined the relationship between SSB price increases and the 2010 Healthy Eating Index (HEI).
Methods: To estimate demand relationships between SSB prices and foods/beverages purchases, purchase and price data from the 2009-2012 Nielsen Homescan Panel was used. A two-part marginal effects model was used to estimate relative changes in purchases associated with a 20% increase in the price of SSBs while controlling for the prices of other foods/beverages. Resulting estimates were applied to dietary intake data from children aged 2-5y from the National Health and Nutrition Examination Survey (NHANES) 2009-10 and 2011-12. HEI scores were computed using the dietary intake data before and after simulating SSB price increases.
Results: With no price increases applied, the overall mean 2010-HEI score was 46.48 ($\pm$ 0.55) of a possible 100 points (higher score indicates better quality). A simulated 20% increase in the prices of SSBs was associated with a slightly lower total 2010-HEI score (-0.85, p<0.01), decreased scores for total fatty acids (-1.03, p<0.01) and total protein (-0.55, p<0.01), and increased scores for refined grains (+0.94, p<0.01) and total intake of solid fats and added sugars (+0.89, p<0.01). A simulated 20% increase in the prices of SSBs was also associated with lower total caloric intake (-171 kcal/d, p=0.01), and lower intakes of juice drinks (-117 kcal/d, p<0.01), refined grains (-125 kcal/d, p<0.01), and oils (-108 kcal/d, p<0.01).
Conclusions: Our findings suggest that a 20% tax on SSBs would decrease total caloric intake among US preschool children. Moreover, such a tax could decrease intakes of foods and beverages high in fats and sugar without appreciably influencing diet quality.

T-OR-2053
Consumers Report That Health Insurance Does Not Often Cover Obesity Treatment, Even When Wellness Programs Target BMI
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Background: Under the Affordable Care Act, obesity treatment and bariatric surgery is often not defined as an essential health benefit. Wellness programs with substantial financial incentives based upon biometric outcomes such as BMI are permitted and reportedly being adopted by employers with increasing frequency. The present study measured consumer perceptions of coverage for obesity treatment by their health insurance and the prevalence of wellness programs with financial incentives based on weight or BMI.
Methods: A total of 9,388 respondents completed anonymous, voluntary online surveys in February 2015. Respondents answered questions about medical services covered by their health insurance. Employed respondents answered questions about employer wellness programs with financial incentives based on weight or BMI. Descriptive statistics were calculated and analyzed to identify significant patterns.
Results: Most respondents reported having health insurance that would pay for hospitalization (70%), a doctor's visit (65%), or prescription blood pressure medication (57%). Only 15-20% reported not having coverage; the remainder were unsure. Reports of coverage for a registered dietitian (RD, 28%), medical weight management (23%), bariatric surgery (26%), or obesity drugs (24%) were significantly less frequent. Among employed respondents, 16% reported that their employer had a wellness program with incentives or penalties

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based on their weight or BMI. Respondents with such wellness programs reported more coverage for obesity treatment: 60% reported coverage for an RD, 53% for medical weight management, 32% for bariatric surgery, and 30% for obesity drugs.

Conclusions: Consumers most often report not having health insurance that will cover obesity treatment. Even when employers target BMI in wellness programs, as they increasingly do, health insurance often excludes obesity treatment.

T-OR-2054
Review of Obesity-Related Items on the United States Medical Licensing Examination (USMLE) Examinations for Medical Students: What is Being Tested?

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Background: The USMLE is a three-step examination required for medical licensure in the United States. Steps 1 and 2 are taken in the second and fourth year of medical school respectively and Step 3 is usually taken after internship. Since the USMLE examinations test the ability of future generations of doctors to recognize and manage important diseases, this study was designed to describe the coverage and distribution of obesity-related items in the examinations.

Methods: All test item cases that included obesity-related keywords (e.g., obesity, obese, body mass index (BMI) ≥ 25, weight loss) were identified by USMLE staff and provided to a panel of six content experts who reviewed all items at the National Board of Medical Examiners (NBME) headquarters. The American Board of Obesity Medicine (ABOM) test outline rubric was used to code items into 4 domains: Basic Concepts (BC); Diagnosis and Evaluation (DE); Treatment (T); Practice Management (PM) and subtopics.

Results: A total of 802 items were reviewed: Only 53% of 119 items from Step 1, 45.2% of 336 items from Step 2 and 21% of 347 items from Step 3 were related to obesity or its co-morbidities. Among these items, the domain distribution was: 11.8% BC, 60.2% DE, 26% T, and 2% PM. Although there was variability between the 3 Steps, obesity-related items were primarily concentrated in the cardiovascular, endocrinology, female reproductive, musculoskeletal, and respiratory organ systems. The identified DE and T items were almost entirely based on obesity co-morbidities, such as diabetes, rather than the diagnosis or treatment of obesity per se.

Conclusions: Although obesity and associated co-morbidities are addressed in the three exams, there is insufficient coverage of its pathophysiology and treatment of obesity as a chronic disease. These results speak to the need for improving the coverage of obesity in medical education and licensure examinations, and to ensure that future generations of doctors are better equipped to manage the epidemic of obesity.

T-OR-2055
Improving Nutrition in Child Care Through State Policy: Evaluation of a Natural Experiment in South Carolina

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Background: State policies to promote healthy eating in young children appear promising, but are largely untested. Recently, South Carolina (SC) implemented mandatory nutrition standards governing child care centers serving low-income children. The purpose of this study was to evaluate compliance with the standards before and after the policy took effect.

Methods: We conducted a quasi-experimental study evaluating compliance with the nutrition standards in SC, using North Carolina (NC)—a state not making policy changes—as the comparison. We conducted assessments in a longitudinal sample of centers and a cross-sectional sample of children before and about 9 months after the standards took effect. Trained observers recorded foods and beverages served to 102 children from 34 centers in SC and 90 children from 30 centers in NC at baseline. At follow-up, the research team observed 99 children from 33 centers in SC and 78 children from 26 centers in NC. The policy was implemented in April 2012 and included 13 standards governing the nutritional quality of foods and beverages served to children, and staff behaviors related to feeding children in care. We conducted logistic regression analyses to examine compliance with each standard at follow-up in SC, compared to NC, adjusting for baseline compliance and other covariates.

Results: Compared to NC, SC centers were more likely to meet the standard prohibiting using food as a reward or punishment (OR 1.36 (CI 1.08, 1.71), p=0.01). Results did not reach statistical significance for the standards requiring at least 2 different fruits served 2 times per day (OR 1.24 (CI 0.99, 1.54), p=0.06) and limiting sweet foods to 2 times per week or less (OR 1.22 (CI 0.98, 1.51), p=0.07). The states did not differ on the number of centers meeting the other ten nutrition standards.

Conclusions: New standards modestly improved nutrition practices in SC, but additional support is needed to bring all centers into compliance.

T-OR-2056
Initial evaluation of systems capacity, integration and sustainability of the Texas Child Obesity Research Demonstration (TX CORD) Study

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Background: Though systems strategies to address obesity are recognized as critical to program success, they are rarely used and poorly understood. TX CORD integrated primary and secondary prevention across multiple community settings. We report initial results from a new tool to assess systems capacity, integration and sustainability in TX CORD.

Methods: TX CORD was conducted in disadvantaged communities in Austin and Houston, TX. Primary prevention centered at Head Start, public primary schools, and primary care clinics. Secondary prevention included an intensive family-based program at the YMCA, with referral from clinics. An interview tool was developed to assess the level and quality of 1) setting-specific leadership and management, staffing, facilities, and commitment to sustained resources and effort; and 2) cross-setting coordination and communication. Thirty items were scored on a scale of 1 (not at all) to 10 (highly). Scores across indicators were added up and divided by the total possible score within each systems domain, giving a percentage where 100% represented the perfect score in that domain. Respondents were 31 administrators across the four

settings in both cities.

Results: Leadership and management scores ranged from 67.7% (clinics) to 83.2% (Head Starts). Staffing capacity ranged from 52.8% (clinics) to 78% (Head Starts). All sites scored ≥79.5% on facilities. Site commitment to sustainability ranged from 60% (clinics) to 83.4% (schools). Across all settings, cross-site communication (M=43.8%) and cross-site coordination (M=20.5%) were the weakest aspects of system integration.

Conclusions: This study illustrates a tool to study integrated interventions and highlights the need to explicitly intervene on systems domains beyond behavioral or environmental targets. Feedbacks in communication and activities are central to a systems approach but often missing in interventions. Assessing these systems dimensions can inform both sustainability plans and future intervention design.