

## Wednesday November 4, 2015 Posters on Display: 12:00-1:30 PM

### T-P-3000

#### One, 25-Dihydroxyvitamin D Regulation of Lipid Metabolism in 3T3-L1 adipocytes

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**Background:** It is well established that vitamin D is sequestered in adipose tissue, and many studies have demonstrated vitamin D regulation of adipocyte differentiation, inflammation, and energy metabolism, highlighting the multifaceted role that vitamin D plays in the regulation of adipose tissue physiology. As dysregulation of adipocyte lipid metabolism is directly related to a variety of metabolic diseases associated with obesity, our studies aim to determine the impact of 1,25-dihydroxyvitamin D (1,25(OH)<sub>2</sub>D) on adipocyte lipid metabolism.

**Methods:** Differentiated 3T3-L1 adipocytes were stimulated with 1,25(OH)<sub>2</sub>D (10 nM) or vehicle for the times indicated. Triacylglycerol (TAG) accumulation, glycerol release and non-esterified fatty acid (NEFA) release were determined using commercially available kits. Fatty acid uptake was assessed using BODIPY FL C16. Protein expression and phosphorylation of lipid metabolism enzymes were determined by Western blotting.

**Results:** 1,25(OH)<sub>2</sub>D stimulated a 21% reduction in TAG accumulation after 4 days (p=0.01), despite an increase in fatty acid uptake following 2-4 days of treatment (p<0.01). Glycerol release was significantly upregulated by 1,25(OH)<sub>2</sub>D following 1-4 days of treatment, and was completely prevented by PKA inhibitor H-89 (75 μM), indicating PKA-dependent lipolysis. Consistent with this, phosphorylation of HSL at PKA phosphorylation site Ser660 was increased by 1,25(OH)<sub>2</sub>D (p=0.02), with no change in HSL protein expression. Interestingly, NEFA accumulation in the cell culture medium was not increased in response to 1,25(OH)<sub>2</sub>D.

**Conclusions:** Collectively, 1,25(OH)<sub>2</sub>D stimulates PKA-dependent lipolysis leading to reduced TAG storage in 3T3-L1 adipocytes. Lack of extracellular NEFA accumulation suggests that the liberated fatty acids are undergoing oxidation or utilization by the cell. These changes in adipocyte lipid metabolism may be protective against excessive fat mass accumulation and metabolic disorders associated with disturbed adipocyte lipid metabolism.

### T-P-3001

#### Adipocyte Diameter in Human Abdominal Fat Compartments: Comparative Analysis of Three Measurement Methods and Their Relevance for Cardiometabolic Risk

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**Background:** Adipocyte diameter (AD) is a marker of the cardiometabolic alterations related to obesity. Although each method has specific advantages and disadvantages in assessing adipocyte population distributions, collagenase digestion (CD), osmium tetroxide fixation (OS) and histological analysis (HIS)

have been used to assess AD. We performed a comparative analysis to test how AD from each method relates to adiposity indices and metabolic variables.

**Methods:** Surgical samples of omental (OM) and abdominal subcutaneous (SC) adipose tissue were obtained from 54 women (age 35.2-58.4 years; BMI 20.9-41.1 kg/m<sup>2</sup>). CD, OS and HIS were used to determine median AD of the Gaussian distribution in each sample. Body composition and fat distribution were respectively assessed by DXA and CT. Fasting blood samples were collected to assess cardiometabolic risk factors.

**Results:** HIS-AD was lower and OS-AD higher than CD-AD in every BMI category for the OM and SC depots (p<0.001 for all). AD measurements by all methods were intercorrelated (r=0.43 to 0.83, p<0.01 for all). Positive associations were found between AD from all techniques and adiposity measurements (p<0.01 for all). HIS-measured AD in OM tissue and OS-measured AD in SC tissue were the best correlates of adiposity measurements (r=0.38 to 0.82). OM AD was associated with HOMA-IR and VLDL-C levels regardless of the technique (p<0.05). In SC adipose tissue, only HIS- and OS-AD were related to HOMA-IR (p<0.01) and only HIS-AD was related to VLDL-C levels (p<0.05). OM HIS- and OS-measured AD were the only correlates of HDL-C levels (p<0.05, for both). Associations were generally stronger in OM than in SC adipose tissue.

**Conclusions:** Although HIS led to smaller AD in all BMI categories, the association between AD and anthropometric or cardiometabolic risk factors was only slightly affected by the method used. Large OM AD was a better predictor of cardiometabolic alterations than large SC AD regardless of the method.

### T-P-3002

#### Differential expression of miRNAs in subcutaneous adipose tissue of women with and without obesity.

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**Background:** A growing body of evidence has been accumulating for the connection between angiogenesis, inflammation and obesity in the last years. MicroRNAs (miRNAs) have been shown to be important regulators of gene expression. We hypothesized that specific miRNAs that target genes involved in angiogenesis, inflammation and adipogenesis are differentially expressed in adipose tissue from women with or without obesity.

**Methods:** Thirteen miRNAs that target genes involved in angiogenesis, inflammation and adipogenesis were selected and their expression was evaluated in subcutaneous adipose tissue (SAT) of 20 women undergoing bariatric surgery and 19 women without obesity submitted to abdominal cosmetic surgery. MiRNAs were quantified using quantitative real-time polymerase reaction and detection with hydrolysis probes.

**Results:** MiR-16 expression was approximately 150 times higher in SAT of non-obese than in obese women (n-fold-change obese vs. non-obese = -151.121; P<0.001). Additionally, the expressions of miR-27b and miR-424-5p were correlated with waist circumference in non-obese women, even after adjustment for body mass index (BMI; r = 0.453; P

= 0.027 and 0.502,  $P=0.014$ , respectively). Moreover, total and central subcutaneous fat were correlated with miR-424-5p levels ( $r=0.475$ ,  $P=0.046$  and  $r=0.506$ ,  $P=0.034$ , respectively). This miRNA was also correlated with BMI in the obese group ( $r=0.582$ ,  $P=0.018$ ).

**Conclusions:** Our results suggest that miR-16 and miR-424-5p expression is correlated with the alterations in adipose tissue that occur in obesity. Both of these miRNAs modulate the expression of the vascular endothelial growth factor (VEGF) gene and its receptor, VEGFR2, which are important regulators of angiogenesis in this tissue.

#### T-P-3003

##### **Human Adipose-Derived Stromal/Stem Cells are Permissive to Infection by Human Cytomegalovirus Resulting in Impaired Differentiation along the Adipogenic and Osteogenic Lineages**

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**Background:** Human cytomegalovirus (HCMV) infection has been linked to atherosclerosis, insulin resistance, metabolic syndrome and diabetes mellitus but the mechanisms involved remain unclear. Adipose inflammation and dysfunction is a common feature of these diseases. Therefore we investigated whether HCMV infection alters adipocyte function.

**Methods:** Human adipose-derived stromal/stem cells (hASCs) were infected with HCMV. The presence of viral gene products was determined by western blotting and immunofluorescent microscopy. Infectious viral progeny were detected by plaque assays. Viral effects on differentiation were measured using oil red O and alizarin staining and quantification. Changes in hASC gene expression were determined by qRT-PCR.

**Results:** We report that hASCs are permissive for complete replication of HCMV. Viral intermediate-early, early, and late gene products were detected in hASCs and the release of infectious progeny was verified. Infected hASCs displayed increased glucose uptake but impaired differentiation abilities along the adipogenic and osteogenic lineages. Expression patterns of genes involved in differentiation was altered in HCMV infected hASCs.

**Conclusions:** These results suggest that HCMV infection of hASCs may promote adipose tissue dysfunction that results in the development of localized and systemic pathogenesis.

#### T-P-3004

##### **In Vivo Adipocyte Kinetics in Subcutaneous Adipose Tissue is Associated with Markers of Metabolic Health**

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**Background:** Adipose tissue (AT) distribution, rather than overall excess adiposity, may be a better determinant of metabolic health. Abdominal fat is classically associated with the complications of obesity, while lower body (gluteal and femoral) fat may be protective. Studies suggest that adipose expansion involves depot-specific cellular mechanisms.

**Methods:** We previously assessed differences in in vivo adipogenesis (new DNA synthesis) between the subcutaneous

abdominal (scABD) and femoral (scFEM) AT depots using an 8 week incorporation of deuterium ( $^2H$ ) into the DNA of adipocytes and preadipocytes in 25 obese women (14 Black; 11 White;  $31 \pm 6$  years; BMI  $32.6 \pm 2.7$  kg/m $^2$ ;  $44.3 \pm 4.1$  % body fat).

**Results:** In our present analysis, we examined how cell proliferation in the adipose depots correlate with risk factors for metabolic syndrome. Cellular preadipocyte and adipocyte formation rates in both the scABD ( $p < .01$ ;  $p < .01$ ) and scFEM ( $p < .05$ ;  $p < .01$ ) depots were positively associated with visceral AT mass. Notably, the proliferation of adipocytes in each depot correlated negatively with insulin sensitivity, as assessed by the Matsuda insulin sensitivity index ( $p < .05$  and  $p < .01$ , respectively).

**Conclusions:** This data suggests that low insulin sensitivity may drive an increase in adipogenic rate to improve insulin sensitivity. This in vivo method will prove useful to assess adipocyte kinetics in response to a variety of interventions, such as diet, exercise or pharmacological treatment.

#### T-P-3005

##### **Increases in estrogen receptor-alpha and fat browning genes can elucidate metabolic improvement due to CB1 antagonism in the fat fed dog.**

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**Background:** We have recently demonstrated that CB-1 receptor antagonism increased expression of genes involved in browning of adipose tissues, specifically in the subcutaneous (SC) and visceral (VIS) depots from the fat-fed canine model. The mechanism(s) by which the CB1 antagonist Rimonabant (RIM) promotes adipocyte browning is unknown. PGC- $\alpha$ , is a co-factor which is involved in browning and transcriptionally regulates the expression and activity of estrogen receptor-alpha (ER-alpha). The current study examines the longitudinal changes of ER-alpha expression in the SC and VIS depots by CB1 antagonist RIM.

**Methods:** Animals were fed a HFD (52% fat) for 6 weeks followed by a continued 16 weeks of fat feeding with either HFD + placebo (PL) ( $n=9$ ) or HFD + RIM (1.25 mg/kg per day;  $n=11$ ). Biopsies from SC and VIS depots were obtained for gene expression: before HFD (Pre-fat), after 6 weeks of fat (HFD) and 16 weeks of HFD +/- RIM.

**Results:** RIM increased ER-alpha, expression in both SC and VIS depots by 3 fold ( $P<0.001$ ) compared to pre-fat and HFD groups. Positive correlations were found between PGC1-alpha and UCP1 with ER-alpha in the VIS depot (PGC-alpha  $r=0.52$ ,  $P<0.05$ ; UCP1  $r=0.66$ ,  $P<0.001$ ). In the SC depot, we found positive correlation between UCP1 and ER-alpha  $r=0.62$ ,  $P<0.005$ .

**Conclusions:** Thus, our data suggest one mechanism by which the CB1-R antagonist increases browning of adipose tissue, through upregulation of the key factors, such as PGC1-alpha, UCP1 and ER-alpha thought to be critical for adipose tissue transformation. Increased browning of fat appears to be an important mechanism by which the cannabinoid system regulates body fat and enhances overall metabolism.

**T-P-3006****Loss of Siah2 protects female and male mice from high fat diet-induced glucose intolerance**

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**Background:** Our previous study in male C57BL/6 wild-type and Siah2KO mice showed that the ubiquitin ligase Siah2 contributes to the relationship between obesity and impaired carbohydrate metabolism. Siah2KO male mice become obese with enlarged adipocytes on a high-fat diet, but do not develop obesity-induced glucose intolerance or insulin resistance. To determine if the effect of Siah2 is sex-dependent, we conducted a pilot study in male and female wild-type and Siah2KO mice challenged with chronic energy excess.

**Methods:** Male and female wild-type and Siah2KO mice were fed a defined low fat (10% fat, 17% sucrose) or high fat (45% fat, 17% sucrose) diet for three months, beginning at four weeks of age. Body weight, food intake and body composition were measured throughout the study and glucose and insulin tolerance tests were conducted at three months on each diet.

**Results:** Although lower in body weight, female mice have higher adiposity than male mice at baseline. Increased adiposity in the females is maintained in mice fed a low fat diet, but when fed an obesogenic diet, adiposity in males exceeds females. Although females gain 50-60% of their body weight on a high fat diet, they remain more glucose tolerant than males. Like the Siah2KO male mice, the Siah2KO female mice are more insulin sensitive than wild-type females as determined by glucose and insulin tolerance testing and fasting glucose and insulin levels.

**Conclusions:** Unlike males, increased adiposity in female mice is not associated with glucose intolerance. The effect of Siah2 on the relationship between adiposity and insulin sensitivity is independent of sex or diet.

**T-P-3007****Microvascular Dilatory Dysfunction and Elevated Expression of COX2 is Associated with Pathological Obesity**

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**Background:** Heterogeneity in obesity pathology demonstrates metabolically healthy (MHO) and pathological (PO) obese cohorts. Vascular dysfunction of small vessels of insulin sensitive tissues contributes to obesity pathology. This study aimed to investigate heterogeneity in endothelium-dependent relaxation of adipose arterioles.

**Methods:** SC and OM vessels from obese patients were used to investigate endothelial relaxation and changes in the expression of genes related to hypertension. Relaxation with acetylcholine (endothelium-dependent relaxant) in the absence or presence of N<sup>o</sup>-Nitro-L-arginine methyl ester (a nitric oxide [NO] synthase inhibitor) was assessed. Relaxation to SNP and PGE2 was also recorded. mRNA expression was ascertained in stromovascular cells (SVF) using hypertension PCR arrays.

**Results:** Depot and disease specific variations in vasorelaxation and mRNA expression were evident. In OM, compared to SC, vasorelaxation to acetylcholine was

attenuated ( $p < 0.01$ ), while relaxation to SNP and PGE2 was greater ( $p < 0.01$ ). In OM vessels acetylcholine curves for MHO patients were less attenuated, compared with PO patients. In MHO patients, OM compared to SC SVF, had elevated mRNA expression for AGT ( $p < 0.0005$ ), ARG2 ( $p = 0.02$ ), CLIC5 ( $p = 0.02$ ), EPHX2 ( $p = 0.05$ ), ITPR1 ( $p = 0.01$ ) and PRKG1 ( $p = 0.004$ ); while PO OM SVF had greater expression of CLIC5 ( $p = 0.04$ ) and PDE3B ( $p = 0.04$ ). A direct comparison of OM SVF of MHO to PO showed only COX 2 remained elevated ( $p = 0.008$ ).

**Conclusions:** Systemic hyperinsulinaemia was associated with adipose microvascular changes in i) NO-mediated vasodilation, and, ii) SVF hypertensive gene profile. Endothelial vasomotor dysfunction and elevated COX2 mRNA expression appears depot-specific with marked impact on OM vessels of insulin-resistant obese subjects.

**T-P-3008****Omental and Subcutaneous Dedifferentiated Adipocytes: Developmental Gene Expression and Re-Differentiation into Multiple Lineages**

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**Background:** Mature adipocytes undergo dedifferentiation to fibroblast-like cells (DFAT cells) when incubated in ceiling cultures over 10 to 15 days. This process is relatively independent of the fat depot, obesity level, sex or age of the cell donor. DFAT cells express embryonic stem cell markers and may re-differentiate into lipid-storing adipocytes or other cell types under appropriate conditions. Our objective was to examine embryonic stem cell gene expression in whole tissue, isolated cell fractions and DFAT cells from the subcutaneous (SC) and omental (OM) fat compartment. The capacity of DFAT cells to re-differentiate into adipocytes or osteoblasts was also tested.

**Methods:** SC and OM adipose tissue samples were obtained during bariatric surgery. A portion of whole tissue was frozen immediately. Mature adipocytes and the stroma-vascular fraction (SVF cells) were isolated by collagenase digestion. Isolated adipocytes were dedifferentiated by ceiling culture. Embryonic stem cell marker expression was measured by real-time RT-PCR. DFAT and SVF cells were re-differentiated into adipocytes (assessed by oil red O staining) or osteocytes (assessed by alizarin red staining).

**Results:** Mature adipocytes from all patients successfully dedifferentiated. Expression levels of Twist1, Tbx5, Hoxc8 and Hoxc9 were significantly higher in OM vs SC tissue ( $p < 0.05$  for all). The same depot difference was observed in mature adipocytes and DFAT cells ( $p < 0.05$ ), but not in SVF cells. Similar trends were observed for Runx2 and Sox9 expression but they did not reach significance. The extent of re-differentiation of DFAT cells into adipocytes or osteocytes was variable and no depot-difference was observed. Similar results were obtained with SVF cells.

**Conclusions:** Depot differences in the expression of several embryonic stem cell markers are maintained in DFAT cells. However, these differences do not relate to the capacity of these cells to re-differentiate into adipocytes or osteocytes.

**T-P-3009****Organic Cation Transporter OCT3 Highly Correlates with UCP1-Rich Deep-Neck Adipose Tissue in Man.**

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**Background:** Uncoupling protein 1 (UCP1)-rich adipose tissue is capable of producing heat from fat and glucose upon norepinephrine stimulation, thus linking it to the treatment of obesity and diabetes. In man, such adipose tissue is found mainly in the deep neck (DNAT). Tissue regulation is a complex, poorly understood matter, but organic cation transporters (OCT) may play a role. OCTs are permeases that regulate a variety of cationic substances, xenobiotics and physiological compounds in multiple tissues. OCT3 has been proposed to participate in catecholamine removal in peripheral tissues with sympathetic innervation as well as in secretion of other signaling molecules, e.g. acetylcholine. The presence of OCT3 in UCP1-rich tissue remains uninvestigated despite the likelihood of an important regulatory role in tissue function.

**Methods:** Human subcutaneous adipose tissue (SAT) and DNAT biopsies are obtained during neck surgery (thyroid and parathyroid surgery). Gene expression is analyzed by qPCR.

**Results:** Adipose tissue biopsies were obtained from 35 individuals, mean age=57.8 (31-84). Analysis showed significantly higher gene expression levels of UCP1 ( $P<0.001$ ), CIDEA ( $P=0.0008$ ), Dio2 ( $P<0.001$ ) and OCT3 ( $P=0.0014$ ) in DNAT compared to SAT. UCP1 expression averaged 32.5 times higher in DNAT. Within DNAT, OCT3 strongly correlates with UCP1 expression ( $P<0.001$ ). Expression of the acetylcholinesterase enzyme significantly correlates with UCP1 expression in DNAT ( $P=0.026$ ), but not when adjusting for OCT3 expression ( $P=0.518$ ). Moreover OCT3 expression is significantly higher ( $P=0.0198$ ,  $n=6$ ) in isolated adipocytes than in stromal vascular fraction.

**Conclusions:** DNAT express high UCP1 levels. OCT3 seems largely confined to the adipocyte and the high correlation with UCP1 suggests an important role of OCT3 in DNAT and BAT function. We are currently investigating the biological role of OCT3 in regulation of human BAT activity.

**T-P-3010****Zerumbone Ameliorates High Fat Diet-Induced Obesity via the Regulation of microRNA-146b/SIRT1 Pathway in Mice**

Jiyun Ahn *Seongnam-si Gyeonggi*, Tae Youl Ha *Seongnam-si Gyeonggi*

**Background:** SIRT1 plays a key role in regulating metabolism, and SIRT1 activation may be a promising strategy to treat metabolic syndrome. This study investigated whether zerumbone ameliorated diet-induced obesity through SIRT1 activation.

**Methods:** We used differentiated 3T3-L1 fibroblasts to examine the effect of zerumbone on adipogenesis through the miR-146b/SIRT1 cascade. To investigate the anti-obesity effect of zerumbone in vivo, we fed zerumbone to high-fat diet-induced obese C57BL/6J mice for 8 weeks and measured body weight, adipose tissue size, and blood lipid profiles. We also measured the effect of zerumbone supplementation on SIRT1 and AMPK signaling pathways in the white adipose tissue of these mice.

**Results:** Zerumbone inhibited adipogenesis through the

miR146b/SIRT1 pathway and significantly reduced diet-induced obesity in mice. Zerumbone supplementation was associated with miR-146b downregulation, followed by the downregulation of SIRT1 and the deacetylation of FOXO1 and PGC1 $\alpha$ , respectively, in the white adipose tissue of these mice. Zerumbone also activated AMPK and modulated lipid metabolism in adipose tissue by increasing fatty acid oxidation and reducing adipogenesis gene expression, respectively.

**Conclusions:** Zerumbone inhibited adipogenesis and ameliorated diet-induced obesity in mice via the miR-146b/SIRT1 pathway, suggesting that zerumbone could target obesity-related metabolic disorders through its stimulation of SIRT1 activity.

**T-P-3011** **$\beta$ -Laphachone attenuates high-fat diet induced obesity through the regulation of miR-494/ATF3 pathway**

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**Background:**  $\beta$ -laphachone (BLC), main active compound of *Tahebo*, has been reported to have anti-obesity effect.

However, the exact molecular mechanism is still unclear. In this study, we tried to find how BLC inhibit obesity in the perspective of miRNA regulation.

**Methods:** We used 3T3-L1 cells to examine the effect of BLC on adipogenesis through the miR-494/ATF3 pathway. To investigate the anti-obesity effect of BLC in vivo, we fed BLC to high-fat diet-induced obese C57BL/6J mice for 8 weeks and measured body weight, adipose tissue size, and blood lipid profiles. We also measured the level of ATF3 in the white adipose tissue of these mice.

**Results:** We observed miR-494 expression was reduced in white adipose tissue (WAT) of high-fat diet (HFD) fed mice. BLC normalized decrease of miR-494 and evoked downregulation of ATF3, one of targets of miR-494. In 3T3-L1 cells, BLC inhibited adipocytes differentiation and upregulated miR-494, which led to decrease of ATF3. The adipocyte differentiation was inhibited in ATF3-knockdown 3T3-L1 cells. The expressions of adipogenesis related markers like PPAR $\gamma$ , Ap2, and C/EBP $\alpha$  were also reduced. We also confirmed the increased level of ATF3 in adipose tissue from obese mice.

**Conclusions:** Taken together, our data demonstrate that BLC may be a useful phytochemical for the prevention of obesity through the upregulation of miR-494 followed by decrease of ATF3.

**T-P-3012****Calcium Sensing Receptor Stimulation in Adipose and Hepatic Cells: Possible Implications in the Metabolic Consequences Associated with Obesity**

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**Background:** We have reported that activation of the calcium sensing receptor (CaSR) may be associated with adipose tissue dysfunction. CaSR is a seven transmembrane, G-protein coupled receptor expressed in human adipose cells, and adipose or hepatic stimulation could generate signals affecting liver function. Aim: To evaluate possible effects of adipose and hepatic CaSR stimulation that may influence the metabolic

consequences associated with obesity

**Methods:** Differentiated LS14 adipocytes were exposed to the calcimimetic cinacalcet (1  $\mu$ M, 24h). Adipokine gene expression (leptin, adiponectin  $\alpha$ 2) was evaluated by qPCR, and  $\alpha$ 2 protein abundance was evaluated by immunoblot. In the human HepG2 hepatic cell line, CaSR expression was assessed by qPCR and the effect of 3-day CaSR stimulation on triglyceride accumulation was evaluated by fluorimetry

**Results:** CaSR activation in LS14 adipocytes decreased adiponectin expression ( $P=0.007$ ) and increased  $\alpha$ 2 protein expression ( $p=0.01$ ). The presence of CaSR was verified in HepG2 human cell line, and 72h cinacalcet-treated cells in the presence of oleic acid exhibited an increased triglyceride content ( $p<0.05$ )

**Conclusions:** Our data suggest that CaSR activation in mature adipocytes is associated with decreased adiponectin and increased  $\alpha$ 2 expression, which may be associated with hepatic insulin resistance and gluconeogenesis, respectively. This, in addition with the observed increased intracellular hepatic triglyceride (a possible marker of hepatic steatosis) suggests that CaSR stimulation could be directly and indirectly involved in the development of the hepatic metabolic consequences associated with obesity

#### T-P-3013

**Central Adrenal And Thyroid Hormone Axes Abnormalities In Obese Children: A Cause For Concern?**  
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**Background:** Obese and overweight (Ob/Ow) children may demonstrate mild elevations in TSH and high cortisol levels, but have normal FT4 and cortisol response to stress. Here we show evidence for central abnormalities in both the thyroid and ACTH axes in (Ob/Ow) children and adolescents.

**Methods:** We aim to determine the prevalence of central hypothyroidism (CH) and central adrenal insufficiency (CAI) in (Ob/Ow) pediatric patients. A retrospective chart review in pediatric patients two years of age and older from our endocrine clinic from January 2013-October 2014. A total of 2687 patient charts were analyzed. Overweight and obesity were defined as a BMI  $>85$ th% and  $>95$ th%tile for age and sex respectively. CH was defined as presence of a low free T4 (equilibrium dialysis) with normal or low TSH (ICMA assay). CAI was diagnosed when cortisol levels failed to rise  $>20$   $\mu$ g/mL at 30 or 60 minutes after 1 mcg IV co-syntropin stimulation. MRI of the pituitary was obtained in all CH and CAI patients.

**Results:** Out of 2687 patient charts, a total of 1627 patients (60%) were identified as (Ob/Ow) of which 60% were female and 40% male. Of these (Ob/Ow) patients who had thyroid functions done, 74 (4.4%) had CH. Of these 74 CH patients, 24 (32%) also had CAI. The mean age of this group was 13.27 years ( $SD\pm 2.73$ ). Of the patients with CH, 5 were on Growth Hormone therapy, 9 on antipsychotic medications, and 3 had panhypopituitarism. 7 Ob/Ow patients (9.4%) with CH or CAI had a pituitary microadenoma on MRI.

**Conclusions:** Although (Ob/Ow) is well-known to impact endocrine function in children, our data suggests a high rate of central hypothyroidism and adrenal insufficiency in these patients. This association has not been documented before. Further investigations are needed to study the pathophysiology, causal relationship between thyroid, adrenal axes and weight

gain and the clinical impact these abnormalities may have on obesity management in the future.

#### T-P-3014

**Circulating Levels of Spexin in Obese vs. Normal Weight Children**

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**Background:** Spexin is a novel peptide that provokes weight loss in rodents with diet induced obesity. Spexin gene expression is down regulated in obese human fat and its concentration is lower in obese compared to lean adults, suggesting a potential satiety-inducing role in humans. There are no reports on Spexin in children. The aim of the study was to determine Spexin concentrations in obese vs. normal weight children in relation to other nutritional and satiety factors and selected adipokines.

**Methods:** A total of 69 children (51 obese and 18 normal weight, Age=15.3  $\pm$ 0.26 years) were studied. Spexin was measured using a specific immunoassay. Leptin, total & high molecular weight adiponectin, interleukin-6 (IL-6), high-sensitivity c-reactive protein (CRP), resistin, e-selectin, free 25(OH) vitamin D, glucose and insulin were also measured. Mann Whitney U test was used to compare the median Spexin between obese and lean children. Pearson and Spearman rank correlations, which ever appropriate, were used to measure association of Spexin with other markers.

**Results:** Spexin levels were significantly lower in obese vs. lean children, 0.33 ng/mL (0.27-0.44) vs 0.42 ng/mL (0.33-0.55);  $p=0.024$ ). Spexin did not correlate with other adipokines and/or insulin and glucose levels, but strongly correlated with free 25(OH) vitamin D levels ( $r=0.589$ ;  $p=0.006$ ,  $n=20$ ).

**Conclusions:** Circulating levels of Spexin are lower in obese children compared to their lean counterparts similar to that reported in adults. This along with the data on lack of relationship between Spexin and other adipokines, but the strong relationship between Spexin and free 25(OH) vitamin D are intriguing. Further studies are required to determine the clinical significance of these findings in obese children.

#### T-P-3015-DT

**Core Body Temperature and Hormonal Responses with Fasting and Overfeeding**

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**Background:** We assessed core body temperature (CBT), urinary free cortisol (UFC) and urinary catecholamines (UCC) during fasting and overfeeding (OF) to investigate underpinnings of energy expenditure (EE) changes.

**Methods:** Sixty-two subjects (13AA/18C/10H/21NA, 13F/49M, 28.5 $\pm$ 10.1% fat, 37.1 $\pm$ 10.3y) with normal glucose regulation and measures of body composition (DXA) had EE assessed in a metabolic chamber during four 24h diets, given in random order with a washout period between each, and including energy balance (EB), fasting, and OF with twice energy requirements using both a high carbohydrate (HC) (75% CHO, 5% fat, 20% protein) and a high fat (HF)(20%

CHO, 60% fat, 20% protein) diet. CBT was measured during each diet, but the analysis was limited to men due to menstrual cycle temperature variation in women. UFC (30.3±14.6 mcg/24h) and UCC were measured during each diet.

**Results:** Compared to EB, EE decreased with fasting (-7.7±4.8%,  $p<0.001$ ) and increased with OF, but more so in the HC diet (14.1±6.0 v 7.8±9.0%;  $p<0.0001$ ). Mean 24h CBT only differed between fasting and HF OF (36.81 v 36.92°C;  $p=0.02$ ). However, maximum daytime CBT increased with any feeding compared to fasting (fasting 37.17 vs. EB 37.28, HC 37.32, HF 37.38°C; all  $p<0.05$ ), but did not differ between diets. Mean 24h CBT correlated with the EE change only during the HC diet ( $\rho=-0.6$ ,  $p=0.01$ ). UFC did not differ by diet, nor did it correlate with changes in EE. Higher UCC correlated with lower %fat ( $r=-0.34$ ,  $p<0.01$ ). UCC were lower during fasting (i.e. norepinephrine-to-epinephrine ratio: 4.5 v 6.3;  $p<0.0001$ ). Higher UCC, adjusted for %fat, correlated with greater EE increase with HC ( $r=0.34$ ,  $p=0.03$ ), but not HF OF. Mean CBT ( $\beta=-1\%$  per 0.1°C;  $p=0.02$ ) and UCC ( $\beta=0.02\%$ ;  $p=0.01$ ) were independent predictors of the increase in EE with HC OF.

**Conclusions:** CBT and UCC increase with feeding. Higher 24h CBT may limit EE increase in HC OF. Mechanisms of EE increase with overfeeding may differ depending on macronutrient intake.

#### T-P-3016

##### Ghrelin Cell-Selective $\beta 1$ -adrenergic Receptor Deletion Induces Hypoghrelinemia and Hypoglycemia

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**Background:** Ghrelin is a gastric hormone with key orexigenic and glucoregulatory actions. These actions are especially evident upon severe food restriction, during which experimental induction of deficient ghrelin causes life-threatening hypoglycemia. While caloric restriction-associated ghrelin release is well-described, components of the ghrelin cell secretory apparatus are mostly unknown. Here, based on earlier findings of high  $\beta 1$ -adrenergic receptor ( $\beta 1$ Adr) expression in ghrelin cells and  $\beta 1$ Adr-dependent stimulation of ghrelin secretion from isolated ghrelin cells, we hypothesized that activation of ghrelin cell  $\beta 1$ Adr is required for caloric restriction-induced ghrelin release and ghrelin's ensuing protective glucoregulatory response.

**Methods:** We generated a mouse model lacking  $\beta 1$ Adr selectively from ghrelin cells (GC- $\beta 1$ AdrKO) by crossing ghrelin-Cre mice to novel mice with a loxP-flanked  $\beta 1$ Adr gene. We assessed ghrelin secretion and metabolic parameters in response to 24h fasting, chronic caloric restriction (40% of usual daily calories x 7 d), chow and high fat diet.

**Results:** GC- $\beta 1$ AdrKO mice had more than 2X lower basal and 5X lower fasting plasma acyl- and total ghrelin. Upon chronic caloric restriction, GC- $\beta 1$ AdrKO mice had 5X lower ghrelin and, unlike control littermates, experienced profound hypoglycemia. Body weight and composition upon chow or high fat diet exposure and fasting-induced rebound feeding were similar in GC- $\beta 1$ AdrKO mice and control littermates.

**Conclusions:** In summary,  $\beta 1$ Adr expression in ghrelin cells is required for basal ghrelin release and for the usual enhanced ghrelin secretory response to caloric restriction. While insufficient ghrelin secretion resulting from ghrelin cell-specific  $\beta 1$ Adr deletion does not impact body weight, body composition or the hyperphagic response to fasting, it does

cause profound hypoglycemia upon chronic caloric restriction. This highlights the critical function of ghrelin to prevent hypoglycemia and promote survival during starvation.

#### T-P-3017

##### Inactivation of Adipose Angiotensinogen Reduces Adipose Tissue Macrophages and Increases Adipose Cell Metabolic Activity

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**Background:** The adipose renin-angiotensin system (RAS) has been linked to obesity-induced inflammation, through mechanisms that are not completely understood. Previously, we reported that overexpression of Angiotensinogen (Agt) in adipose tissue increased adiposity, insulin resistance, adipose and systemic inflammation in mice fed a low-fat diet (LFD)

**Methods:** To further dissect the direct role of adipose Agt in metabolic disorders, we created an adipose specific Agt knockout (Agt-KO) mice using the Cre-LoxP system. Agt-KO and control (WT) littermates were fed either a LFD or high-fat diet (HFD) to assess metabolic changes when AGT was inactivated. Additionally, gene and protein expression analyses were performed on white adipose tissue (WAT) from these mice. Further, we isolated WAT stromal vascular cells for metabolic extracellular flux assays.

**Results:** No significant differences in body weight or fat mass were observed between the WT and the Agt-KO groups on either diet. However, GTT showed that the latter cleared glucose more rapidly than the WT mice, consistent with higher expression of genes involved in glucose transport, fatty acid metabolism and insulin signaling. Furthermore, adipose Agt inactivation reduced total macrophage infiltration in both the LFD and HFD fed Agt-KO mice. Lastly, extracellular flux analyses revealed an overall increased metabolic activity (both in oxygen consumption and extracellular acidification rates) in stroma vascular cells from Agt-KO compared to WT mice.

**Conclusions:** Our findings indicate that adipose-specific Agt inactivation leads to reduced adipose inflammation and increased glucose clearance mediated at least in part via increased metabolic activity of adipose cells. Funded by a GIA from the AHA Southwest Affiliate

#### T-P-3018

##### Plasma Steroids and Obesity in Women: Elevated Total Adiposity Relates to Low Levels of Androgenic Steroids and Their Precursors

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**Background:** In men, obesity has generally been associated with hypoandrogenism. In women, the association between androgen levels and adiposity remains equivocal. Methodological limitations in measuring low steroid levels may explain these discrepancies. To date, obesity-related alterations in the global profile of circulating steroids have never been clearly examined in women.

**Methods:** In a sample of 41 premenopausal women (age 46±3 years; BMI 26.9±4.1 kg/m<sup>2</sup>) undergoing elective gynecological surgery but otherwise healthy, 19 plasma

steroids were quantified using the SteroIDQ kit (Biocrates, Austria) and HPLC-MS/MS. Body composition and fat distribution were assessed by dual-energy X-ray absorptiometry and CT respectively.

**Results:** Several negative correlations were found between adiposity measurements including BMI, total body fat mass, body fat percentage or total abdominal adipose tissue area and plasma levels of androstenedione ( $r=-0.33$  to  $-0.48$ ,  $p\leq 0.04$ ), dihydrotestosterone (DHT) ( $r=-0.38$  to  $-0.49$ ,  $p\leq 0.02$ ), 17-hydroxyprogesterone (17-OH-P) ( $r=-0.32$  to  $-0.38$ ,  $p\leq 0.05$ ) and plasma levels of steroid precursor pregnenolone ( $r=-0.35$  to  $-0.48$ ,  $p\leq 0.03$ ). Testosterone levels were not significantly associated with total or regional adiposity measurements. Significant negative correlations were also found between total body fat mass and plasma levels of 11-deoxycorticosterone (11-DOC) ( $r=-0.32$ ,  $p\leq 0.05$ ). Plasma levels of 17-OH-P ( $r=-0.32$ ,  $p<0.05$ ) and 11-DOC ( $r=-0.32$ ,  $p<0.05$ ) also correlated negatively with SC adipose tissue area while DHT correlated negatively with visceral adipose tissue area ( $r=-0.37$ ,  $p=0.02$ ). In general, steroid levels were more closely related to total adiposity than visceral adiposity. Other steroids such as cortisol, aldosterone and their precursors were not related to adiposity measurements.

**Conclusions:** Plasma androgen levels and their precursors are lower in women with obesity, suggesting a possible reduction in adrenal or ovarian synthesis of these steroids.

#### T-P-3019

##### The underlying mechanisms of osteo-sarcopenic obesity in a menopausal experimental model

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**Background:** Obesity has been linked to sarcopenia and recently fat mass has been negatively correlated with bone mass. The purpose of this study was to evaluate the potential mechanisms underlying obesity, sarcopenia and osteoporosis that may co-occur in the aging female body.

**Methods:** Thirty six 5- and 10-month-old female rats were chosen to model pre- and post-menopausal women, respectively. Rats were divided into three treatment groups in each age category: sham, ovariectomized (ovx), and ovx+E2 (receiving 17 $\beta$ -estradiol twice a week) and were pair fed with a semi-purified diet. Body composition was measured by dual-energy x-ray absorptiometry. Bone properties were examined by micro-computed tomography. Serum C-telopeptides of type I collagen (CTX), bone-specific alkaline phosphatase (B-ALP), and E2 were analyzed. Plasma protein concentrations and gene expressions of anabolic and catabolic factors affecting lean mass were assessed.

**Results:** The co-occurrence of obesity and sarcopenia along with osteoporosis was observed in older ovx rats that was prevented by E2. Osteo-sarcopenic obesity in this group was associated with a significant ( $p < 0.05$ ) decrease in energy expenditure (57%), increase in markers of bone turnover (26% increase in CTX and 34% increase in B-ALP), and imbalance in insulin like growth factor-I levels compared with corresponding sham animals. In both ovx age categories, the ratio of tibial bone mineral density to combined muscle mass was significantly lower (12% and 21%, respectively for young and old animals) than that of sham, that was prevented by E2. Interestingly, muscle mass in younger obese and osteoporotic ovx rats remained unchanged.

**Conclusions:** Our findings suggest that the co-occurrence of

obesity and sarcopenia along with osteoporosis may be found in females with a low estrogen state. This can be in part explained by decreased energy expenditure and imbalances between catabolic and anabolic molecules that regulate bone and muscle mass both at the local and systemic level.

#### T-P-3020

##### Changes in Lean Muscle and Intermuscular Adipose Tissue Following Bariatric Surgery

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**Background:** Intermuscular adipose tissue stores (including fat between and within a muscle) are associated with insulin resistance and reduced muscle strength and mobility. While low muscle density is observed in obese individuals, studies have shown that weight loss reduces intermuscular adipose tissue. We examined changes in area and density of lean mass and muscular fat stores in extremely obese adults following bariatric surgery.

**Methods:** Using peripheral quantitative computed tomography (pQCT) scans and Image-J image analysis software with Bone-J plugin, we prospectively examined lean muscle density (LD) and lean muscle area (LA), and intermuscular fat density (FatD) and area (FatA) at the 66% tibia (calf) pre-surgery (baseline), and 3, 6, and 12 months post-surgery in 21 (15 female, 6 male) obese bariatric surgery participants ( $45.3 \pm 12.7$  years; BMI  $45.3 \pm 6.4$  kg/m<sup>2</sup>).

**Results:** Compared to baseline, 12-month body weight declined 33.5 kg (-23%,  $p<0.001$ ). LD increased only at 12 months post-surgery (+1.3%,  $p=0.021$ ), while LA significantly decreased at each time point with a 13% ( $p=0.003$ ) decline at 12 months. FD remained unchanged over time, but FA declined 45% ( $p=0.004$ ) at 12 months compared to baseline.

**Conclusions:** We showed that 12-month post-bariatric surgery changes in limb area at the calf among extremely obese adults were mostly due to decreased intermuscular fat area, rather than lean muscle area. Similar to previous studies, muscle density significantly increased over time. Future research should examine whether changes in intermuscular adipose tissue stores persist beyond the first postoperative year and whether they are related to muscle strength and mobility.

#### T-P-3021

##### Depot-Specific Effects of Treadmill Running and Rutin on White Adipose Tissue Function in Diet Induced Obese Mice

Zhongxiao Wan *Suzhou Jiangsu*

**Background:** We aimed to explore 1) the effects of treadmill exercise training or rutin intervention independently and in combination on endoplasmic reticulum (ER) stress markers and adiponectin mRNA expression; and 2) whether there are depot-specific effects.

**Methods:** A total of 60 C57BL/6J mice were randomized into 5 groups: chow group, high fat diet group (HFD), HFD plus rutin intervention group (HR), HFD combined with treadmill running group (HE), HFD combined with treadmill running and rutin group (HRE). At the end of the 16 weeks' intervention, adiponectin mRNA expression and ER stress markers protein expression were determined.

**Results:** In epididymal adipose tissue, HFD resulted in reduction in adiponectin mRNA expression, PPAR- $\gamma$  and Dsb-AL protein expression, elevation in ER stress markers

including GRP78, CHOP and p-JNK. Rutin or exercise restored the protein expression of ER stress markers to normal levels. Exercise restored PPAR- $\alpha$  and Dsb-AL protein expression to normal levels. In subcutaneous adipose tissue, HFD led to increased adiponectin mRNA expression, and PPAR- $\alpha$ , GRP78 and p-JNK protein expression; HFD also resulted in reduction in Dsb-AL.

**Conclusions:** Depot-specific effects existed in regards to the effects of rutin or exercise on adipose tissue function from DIO mice.

#### T-P-3022

##### Adjunct Therapies and the Efficacy of the Adjustable Gastric Band – Insights from a Rodent Model

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**Background:** It is well-established that there is a compensatory reduction in energy expenditure associated with all weight loss therapies, including bariatric surgery. This highlights the potential to exploit adjunct therapies to elevate energy expenditure or at least counteract its compensatory reduction and, as such, improve the efficacy of the adjustable gastric band (AGB).

**Methods:** Diet-induced obese male Sprague Dawley rats were either sham-operated or fitted with an AGB just below the gastro-oesophageal junction, mimicking the situation in human surgeries. Rats in each of these groups were then divided into cohorts that received either vehicle, thyroxine (100ug/kg/day) or Contrave (bupropion 5mg/kg/day + naltrexone 0.25mg/kg/day). Metabolic parameters, including food intake, body weight and fat mass were assessed. Biotelemetry devices implanted between the interscapular lobes of brown adipose tissue (BAT) were used to assess the impact of AGB on energy expenditure in BAT. The role of AGB in changing the sensitivity of the brain to satiety hormones was assessed by administering GLP-1 agonist (Byetta) to lean rats, which were then perfused for immunohistochemistry analysis of cFos activation.

**Results:** Inflation of the AGB caused a reduction in body weight gain that was further enhanced by co-treatment with thyroxine or Contrave ( $p < 0.05$ ). AGB-induced reductions in body weight and fat mass are associated with reductions in energy expenditure in BAT that can be effectively ameliorated by co-treatment with thyroxine or Contrave, both of which increase energy expenditure. The combination of AGB and Byetta significantly elevated Fos labelling in the NTS compared to sham vehicle animals ( $p < 0.0001$ ).

**Conclusions:** These data support the notion that adjuvant therapies may improve AGB-induced satiety and weight loss, possibly via an action on energy expenditure. They provide further insight into the mechanisms underlying the efficacy of AGB.

#### T-P-3023

##### Effect of Surgical Weight Loss by Gastric Bypass on Stool Microbiome

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Pareja *Sabadell Spain*, Pere Rebas *Sabadell Spain*, Alexis Luna *Sabadell Spain*, Zhan Gao *New York NY*, Sarah Stano *New York NY*, James McGinty *New York NY*, Nan Shen *New York NY*, Jose Clemente *New York NY*

**Background:** A number of mechanisms have been identified that play a role in the metabolic improvement following Roux-en-Y gastric bypass surgery (RYGB) including altered microbiota. The goal of this study was to assess temporal changes in  $\alpha$  and  $\beta$  diversity of microbiome in obese individuals, before and after RYGB in 2 groups of individuals living in New York City (NYC) and in Barcelona (BCN). We hypothesized that: alpha diversity would increase after RYGB; the ratio of F/ B will decrease after RYGB; the effect of RYGB-induced weight loss will trump geographical microbial differences.

**Methods:** Samples were collected at home in provided kits, brought to our laboratory frozen, and kept at -80C. DNA extraction was done using MOBIO PowerLyzer PowerSoil DNA isolation kit, followed by Illumina sequencing in V4 region. The 16S rRNA gene was amplified and sequenced with barcoded primers. Raw data was processed using QIIME 1.8.0 with default parameters. Bacterial diversity was estimated using Faith's phylogenetic diversity. Beta diversity was measured using unweighted UniFrac.

**Results:** Baseline BMI=46.1 $\pm$ 6.4 kg/m<sup>2</sup>, age=42 $\pm$ 12 years, HbA1C=6.2 $\pm$ 1.1% and weight loss at one year=41.5 $\pm$ 12.4 kg (34%), were not different between the two cohorts (NYC=13, BCN=12). Contrary to hypothesis, there was no difference in terms of alpha or beta diversity between the 2 cohorts prior to surgery. There was a clear separation in microbial composition between pre-and post-surgery. There was a trend for an increase in alpha diversity 1 year after surgery. Beta diversity did not differ between the 2 cohorts at any time points after surgery.

**Conclusions:** Although geographical differences in diet have been shown to impact the microbiome, the severe obesity phenotype appears to trump these effects, as no difference between the two cohorts was observed prior to surgery. The effect of surgery was similar in both cohorts. More detailed analysis need to be conducted to evaluate the link between change in the microbiome and metabolic outcome.

#### T-P-3024

##### The Cranial Mesenteric Artery Supplies Gastrointestinal Sites of Action Regulating Meal Size and Intermeal Interval Length by Glucagon-Like Peptide-1

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**Background:** The current work hypothesized that the gastrointestinal tract contains site(s) of action regulating meal size (MS) and intermeal interval (IMI) length by glucagon-like peptide-1 (GLP-1).

**Methods:** To test this hypothesis GLP-1 (0.5 nmol/kg) was infused in the celiac artery (CA, supplying the stomach and upper duodenum), cranial mesenteric artery (CMA, supplying upper and most of the lower gut), femoral artery (FA, control) and portal vein (PV, drains the gut) in free-feeding rats prior to the onset of the dark cycle and first MS (chow), second MS, IMI and satiety ratio (SR=MS/IMI) were determined.

**Results:** We found that (1) GLP-1 infused by the CA, CMA and FA reduced the first MS relative to saline vehicle and the CMA route was more effective than the other routes, (2) GLP-1 infused only in the FA reduced the second MS, (3) GLP-1

infused only in the CMA prolonged the IMI and (4) GLP-1 infused in the CMA increased the SR, and more so than the remaining routes.

**Conclusions:** In conclusion, consistent with our hypothesis the data here suggest that the gastrointestinal tract contains sites of action controlling MS and IMI length by GLP-1. The area supplied by the CMA, small and part of the large intestine, may contain such sites.

#### T-P-3025

##### **The Metabolic Impact of Laparoscopic Sleeve Gastrectomy in Morbidly Obese Indian Diabetic Patients At the End of Seven Years**

Jayashree Todkar *Pune Maharashtra*

**Background:** Laparoscopic sleeve gastrectomy (LSG) is a standard bariatric operation. It also shows a metabolic impact in terms of improvement in diabetes type 2 (T2DM) in morbidly obese patients. Sparse reports exist about the longevity of its metabolic impact. This is the study to present the results of LSG in Indian obese patients with T2DM at the end of seven years.

**Methods:** From 2006 till 2010, 124 patients of Indian origin with morbid obesity and T2DM have undergone a LSG at our center by a single surgical team. The standard operation of LSG and the multidisciplinary care with regular follow ups was provided to all of them. At the end of seven years we could collect information of 81 patients.

**Results:** N=81. M:F :: 29: 62. Age range 22 - 65 yrs. Duration of T2DM : 6 mths to 21 yrs. BMI range : 35 - 68 kg / m<sup>2</sup>. On OHA only : 56. OHA + Insulin : 25. Average glycosylated Haemoglobin was 8.5%. At the end of seven years average BMI loss was found to be 18 kg /m<sup>2</sup>. The average glycosylated hemoglobin was 6.8 %. The insulin usage (in reduced doses) was needed in only 3 patients. 68 patients out of 81 did not need any anti diabetic medication. 10 patients were on a single OHA. 76/ 81 had other medical comorbidities related to obesity and all showed an improvement even at the end of seven years. 21/81 showed some weight gain (average 5 kg) at the end of 7 years but could retain their metabolic improvements as compared to the baseline.

**Conclusions:** LSG seems to be a good surgical and metabolic tool to improve the diabetic status in morbidly obese Indian T2DM patients even at the end of seven years.

#### T-P-3026

##### **Maternal Protein Restriction During Pregnancy and Lactation Reduces Hepatic Triglyceride Content in Adult Male Rat Offspring: Role of SREBP-1c-Regulated Pathways of Fatty Acid and Triglyceride Synthesis**

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**Background:** Maternal protein restriction during pregnancy and lactation reduces liver triglyceride (TG) content in adult male rat offspring. However, the mechanisms mediating this decrease are not understood. The aim of this study was to determine if the decrease in liver TG content was due to a decrease in SREBP-1c regulated pathways of lipid synthesis.

**Methods:** Pregnant Sprague Dawley rats were given a control (19% protein) or a low protein (8% protein) diet throughout pregnancy and lactation. Pups were weaned onto standard lab

chow on day 28 and sacrificed on day 65. Activities of critical enzymes in lipid synthesis were determined via enzymatic assays and hepatic expression of select genes and proteins were determined by qRT-PCR and Western blotting.

**Results:** We initially examined the status of key enzymes in synthesis of fatty acids, the precursors of TG. There were no differences between control and low protein (LP) offspring in the enzymatic activity of acetyl-CoA carboxylase and gene expression of fatty acid synthase. We next evaluated the status of the TG synthesis pathway. The activity of glycerol-3-phosphate acyltransferase, a rate limiting enzyme in TG synthesis, and the gene expression of fatty acid desaturases 5 and 6 and the elongase ELOVL6 were similar in the two groups. Finally, we examined if there were changes in PNPLA3, whose expression is associated with increased hepatic TG content, and stearoyl-CoA desaturase 1 (SCD1) whose activity increases PNPLA3 protein levels. PNPLA3 and SCD1 exhibited reduced mRNA expression in LP offspring consistent with their lower liver TG content. However, protein amounts of PNPLA3 and SCD1 were similar in both groups. Consistent with these results, protein expression of SREBP-1c, a master regulator of fatty acid and TG synthesis, was also similar in control and LP offspring.

**Conclusions:** The reduction in liver TG content in male offspring of protein restricted mothers does not appear to be due to decreases in SREBP-1c-regulated fatty acid and TG synthesis.

#### T-P-3027

##### **The Effect of Docosahexaenoic Acid (DHA) on Adipocytes Exposed to Hypoxia in 3T3-L1 Cell Line**

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**Background:** Docosahexaenoic acid (DHA), Omega-3 fatty acid has been reported to have anti-obesity effect. Hypoxia is a condition that result from the excessive expansion of the white adipose tissue that causes obesity-related conditions like insulin resistance, inflammation and oxidative stress amongst others.

**Methods:** The objective of this study was to test the effect of DHA on the hypoxia affects (1.0 % for 24 hours) of 3T3-L1 adipocytes with a deliberate focus on oxidative stress, inflammation, and mitochondrial functions and antioxidants status. Cell viability, reactive oxygen species (ROS) and apoptosis were evaluated by flowcytometry. The metabolic parameters such as lactate, glycerol release, glucose uptake and ATP content were evaluated by fluorometer. The expression of HIF-1 and the secretion of adipocytokines were evaluated by qPCR and Elisa.

**Results:** The results showed significant changes in all critical parameter of adipocyte biology such as HIF-1 $\alpha$  expression (50 %  $\downarrow$ ), lactate and glycerol release (66%  $\downarrow$  and 25%  $\downarrow$  respectively), (ROS) production (15 %  $\downarrow$ ), glucose uptake (25 %  $\downarrow$ ), decrease secretion of pro-inflammatory markers (IL-6 by 31 % , MCP-1 by 38 % ) and leptin 14 % and increase adiponectin secretion by 45 % , by DHA treated cell in hypoxia condition compare with cells treated with hypoxia only.

**Conclusions:** Taken together, our data indicate that DHA can exert potential anti-hypoxia effects by reduce the secretion of inflammatory adipokines, oxidative stress, lipolysis and apoptosis this could highlight that DHA can exert potential anti-obesity effects

**T-P-3028**

**A Picture is Word a Thousand Words, and Then Some: Preliminary Findings from an Exploratory fMRI Study**

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**Background:** Traditional methods for recording diet use self-reported written descriptions of food intake. Recent work, however, suggests that reviewing digital images of diet (via cell phones) improves memory accuracy (Long et al., 2013) and compliance (Mulvaney & Herbold, 2013) for dietary recording. It is important to understand the cognitive processes associated with creating and retrieving images of personal diet items and how they may influence food-related affect and behaviors (Higgs, Robinson, & Lee, 2012). Interestingly, brain responses to word vs. picture recordings have not been broadly explored.

**Methods:** A college sample (n= 16) used smartphone cameras to record 3 days of diet. Participants sent pictures of all food/drink consumed to researchers and entered word descriptions of each on a meal tracking website. Pictures and word descriptions were used by researchers to create digital stimuli for visual presentation during a subsequent fMRI scan. Nine total stimuli of 3 types were presented randomly: 3 food images, 3 word descriptions, 3 food images + matching word descriptions. For each stimulus image, subjects rated (1-7) the strength of agreement with 3 statements (S1: I remember eating this, S2: I would eat something like this again, S3: I would recommend this food to another person).

**Results:** ANOVA revealed stronger agreement when viewing images versus words alone for S1 (p =.01) and S3 (p=.04). Images plus words produced stronger agreement than words alone for S3 (p=.01). fMRI data support the S1 and S3 rating data; for S1 there was more activation in brain regions associated with memory (hippocampus) when viewing images/images plus words compared to words alone; for S3 there was greater activation for image-related stimuli than words in regions associated with decision making (frontal lobe) and emotion (lingual gyrus).

**Conclusions:** Preliminary findings shed light on cognitive processes associated with the use of personal pictures to record food intake. Clinical implications will be discussed.

**T-P-3029**

**Anatomical Connections in the Brain Based on Body Mass Index in Lean, Overweight, and Obese Individuals**

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**Background:** Alterations in ingestive behavior have been implicated as a factor in the pathophysiology of obesity. Multimodal neuroimaging evidence indicates alterations in regions of the extended reward and associated somatosensory, salience and emotion regulation networks. Diffusion tensor imaging measures the microstructural organization of neural tissue which is critical for the integrity of fractional anisotropy (FA), which determines how white-matter mediates communication in the brain. The aim of the study was to: Determine BMI-based group differences in white-matter integrity as measured by FA and correlations between FA

group differences and clinical variables.

**Methods:** 60 healthy subjects completed MRI. Images were registered to the MNI atlas, and statistical parametric maps of white and gray-matter were created for FA, using a threshold p-value=0.05 and cluster size=250 mL. Subjects were divided into three groups: lean (N=29, 17 males), overweight (N=25, 18 males), and obese (N=6, 4 males).

**Results:** Compared to lean, overweight subjects had a minor increase in FA in the corpus callosum, external capsule, thalamic areas, and somatosensory areas. Compared to lean and overweight subjects, obese subjects showed reductions in FA in external and internal capsules, brainstem, supra tentorial and somatosensory regions. Mean FA increased slightly with BMI in the respective brain regions from lean to overweight, but decreased significantly with BMI values in the obese range. Correlation analysis between mean FA and clinical variables indicated an overall negative correlation with increasing BMI.

**Conclusions:** FA is correlated to BMI, and obese individuals experience a decrease in FA representative of a decrease in white matter directional coherence. However, the relationship between FA and BMI does not appear to be linear. Future research focusing on larger populations of obese individuals is necessary to better characterize the neuro-architectural transition from the overweight to an "obese brain."

**T-P-3030**

**Appetitive traits are associated with the neural response to food portion size in children**

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**Background:** The effect of portion size on energy intake varies with appetitive traits, but why this occurs is unclear. One possibility is that neural circuitry involved in cognitive control and reward is disrupted in those who have poor appetite regulation, which may lead to overeating from large portions.

**Methods:** The aim was to determine if neural responses to food portion size are associated with appetitive traits in children (n=36, 7-10 yr). Functional MRI was used to assess brain response to food images at two portion sizes (Large, Small) and non-food images (Scrambled, Furniture). Repeated measures ANOVA was used to extract BOLD activation from various contrasts (Large>Small, Large>Scrambled) bilaterally in regions previously associated with cognitive control (inferior frontal gyrus; IFG) and reward (ventral tegmental area; VTA). The activation in the IFG and VTA for these contrasts was then correlated with appetitive trait scores from the Children's Eating Behavior Questionnaire (CEBQ).

**Results:** Increased activation in the left IFG was associated with higher food enjoyment scores for the Large>Scrambled contrast (p<0.05). Decreased activation in the left VTA was associated with greater slowness in eating scores for the Large>Scrambled (p<0.05) and the Large>Small contrasts (p<0.05). Decreased activation in the right IFG was associated with higher food fussiness (p<0.05) but also higher emotional overeating (p<0.05) for the Large>Small contrast.

**Conclusions:** Our hypothesis that traits of poor appetite regulation would be negatively correlated with IFG activation but positively correlated with VTA activation was partially

confirmed. The findings suggest that brain regions involved in inhibitory control and reward are engaged differently in response to large portions of food depending on children's appetitive traits. These results may allow us to identify children who are at risk for overeating based on both parent-rated appetitive drive and neural response to portion size.

**T-P-3031****Impulsivity and Brain Responses to Visual Food Stimuli in Adults with Obesity**

Shannon Donofry *Pittsburgh PA*, Jennifer Watt *Pittsburgh Pennsylvania*, Renee Rogers *Pittsburgh PA*, Timothy Verstynen *Pittsburgh Pennsylvania*, John Jakicic *Pittsburgh PA*, Kirk Erickson, PhD *Pittsburgh PA*

**Background:** Brain regions associated with impulsive decision making may be related to obesity. In support of this hypothesis, obesity-related differences in frontostriatal (FS) pathways are related to hedonic eating, particularly among women. Importantly, impulsivity and FS activation patterns are also associated with treatment outcome suggesting that a better understanding of gender differences in FS reactivity and impulsivity could help inform treatments. Here we examined whether the relationship between impulsivity and FS responses to food cues varied between men and women with obesity.

**Methods:** The sample included 44 adults matched on age ( $M = 45.05$ ,  $SD = 7.94$ ) and body mass index (BMI) ( $M = 30.98$ ,  $SD = 2.67$ ) prior to a behavioral weight loss intervention.

Impulsivity was assessed using the Iowa Gambling Task (IGT). Participants viewed high and low calorie foods and neutral non-food items during a functional MRI scan. Beta coefficients were extracted from regions involved in impulsivity or eating, including the nucleus accumbens (NAc), putamen, frontal cortex, and insula. Regression models were constructed with gender, BMI, and IGT scores predicting percent signal change in each region.

**Results:** Women exhibited higher activation than men in the NAc ( $\beta = 0.448$ ,  $p < 0.01$ ) and putamen ( $\beta = 0.345$ ,  $p = 0.03$ ) in response to high relative to low calorie foods, and in the superior frontal gyrus when viewing food relative to neutral images ( $\beta = 0.444$ ,  $p < 0.01$ ). Greater impulsivity predicted elevated insula responses to high relative to low calorie foods in both genders ( $\beta = -0.343$ ,  $p = 0.03$ ).

**Conclusions:** These data provide evidence that women exhibit elevated reactivity to food cues in FS regions associated with decision making and reward processing, which may have implications for understanding mechanisms influencing risk for obesity. These results may suggest that interventions need to be tailored to these gender differences in food cue reactivity to enhance effectiveness.

**T-P-3032****Overweight and Obese Individuals Display Abnormal Resting-State Brain Connectivity between the Reward System (Nucleus Accumbens and Amygdala) and the Prefrontal Cortex**

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**Background:** The nucleus Accumbens (NAc) and the Amygdala (AMY) play a critical role in food-related reward processing and in the modulation of feeding behaviors. Resting-state functional MRI (RS fMRI) is used to assess intrinsic brain connectivity in human populations. Hypotheses: 1) Brain circuits involved in the reward system show different functional connectivity (FC) patterns between obese/overweight (O/O) and lean individuals, 2) NAc and AMY FC differ among men and women with normal and high body-mass-index (BMI)

**Methods:** 98 healthy subjects, age:  $30.6 \pm 10.7$ , were divided into 48 lean (BMI:  $24.5 \pm 3.7$ ; females: 25) and 50 O/O subjects (BMI:  $27.2 \pm 5.07$ , females: 24). We used a 3 Tesla Trio scanner for imaging. Individual seed-to-voxel connectivity maps for NAc and AMY were created. Fisher transformed bivariate correlation maps were implemented in SPM8. Significance at a threshold of  $p < 0.05$ .

**Results:** Lean subjects had greater FC of NAc with dorsomedial prefrontal-cortex (dmPFC), mid-PFC and inferior-frontal than O/O subjects. AMY FC with dlPFC, anterior cingulate cortex (ACC), insula and hippocampus was greater in normal vs high-BMI. Gender differences: lean women had greater NAc FC with several regions of PFC than O/O women. Lean men had increased NAc FC with inferior frontal cortex and AMY than O/O men. O/O women had enhanced NAc FC with hippocampus and insula than men. O/O males had increased FC with the superior frontal cortex than women. Lean women showed greater FC of the AMY with dlPFC and precuneus than O/O women. O/O males had increased FC of the AMY with dlPFC and hippocampus than O/O females.

**Conclusions:** Healthy subjects brains showed altered resting state functional connectivity related to BMI. Normal BMI was associated with enhanced connectivity of the NAc and AMY with prefrontal regions when compared to high-BMI. These findings suggest a compromised top down control of key reward regions by the prefrontal cortex in overweight/obese subjects, in particular in female subjects.

**T-P-3033****Strengthened Functional Connectivity of Taste Sensory and Pleasantness Pathway in Metabolic Syndrome**

Ekarin Pongpipat *El Cajon California*, Aaron Jacobson *Santee CA*, Claire Murphy *San Diego CA*

**Background:** Metabolic syndrome is a set of risk factors that increases the risk of heart disease, stroke, diabetes, and late-life cognitive impairment and dementia. The risk factors include high blood pressure, a high blood sugar level, abdominal obesity, and abnormal cholesterol levels. The neural taste pathway from the frontal operculum and orbitofrontal cortex may help further delineate metabolic syndrome. The frontal operculum is involved in sensory processing of taste and the orbitofrontal cortex (BA10) is involved in processing pleasantness of taste. The current study examines the functional connectivity between the frontal operculum and orbitofrontal cortex in individuals with metabolic syndrome and healthy controls.

**Methods:** 50 participants (25 healthy controls, 25 metabolic syndrome) underwent functional Magnetic Resonance Imaging while rating the pleasantness of caffeine, sucrose, and saccharin.

**Results:** For middle-aged individuals (45-54 years of age) tasting sucrose, the relationship between the activity of the frontal operculum and the BA10 depends significantly on metabolic syndrome status such that healthy controls have a

negative relationship, while individuals with metabolic status have a positive relationship. For older individuals (60+ years of age) tasting sucrose, the relationship between the activity of the frontal operculum and the BA10 depends significantly on metabolic syndrome status such that healthy controls have a negative relationship, while individuals with metabolic status have a positive relationship.

**Conclusions:** The results suggest that those with metabolic syndrome have a stronger functional connection between processing the sense of taste and evaluation of pleasantness of taste compared to healthy controls for middle-aged and older individuals when tasting sucrose. The strengthened functional connectivity may lead to a stronger and faster processing of the sensory taste and pleasantness of sucrose. Supported by NIH grant AG004085-26 from NIA to CM.

**T-P-3034**  
**Stunted PFC Activity During Neuromuscular Control Under Stress with Obesity**  
Ranjana Mehta *College Station Texas*

**Background:** Obesity is an established risk factor for cerebral health and impaired cognition, which is primarily regulated by the prefrontal cortex (PFC). However, very little is known about the neural pathways that underlie obesity-related decline in neuromuscular control that affect physical functioning, particularly under stress. The purpose of this study was to determine the role of the PFC on neuromuscular control during handgrip exertions under stress with obesity.

**Methods:** Twenty non-obese and obese young adults performed submaximal handgrip exertions in the absence and presence of a stressful task. Force fluctuations (indicator of neuromuscular control) and oxygenated hemoglobin (HbO<sub>2</sub>: a measure of PFC activity) measured using functional near infrared spectroscopy were obtained.

**Results:** Force fluctuations increased by 26% in the stress when compared to the control condition ( $P=0.001$ ). Additionally, obesity was associated with 39% greater force fluctuation ( $P=0.024$ ), and stress magnified this relationship ( $P=0.063$ ). Higher HbO<sub>2</sub> levels were observed in the non-obese compared to the obese group ( $P=0.009$ ). In addition, higher HbO<sub>2</sub> levels were observed in the stress compared to the control condition in the non-obese group; however this trend was reversed in the obese group ( $P=0.043$ ).

**Conclusions:** The current study provides the first evidence that neuromuscular decrements with obesity were associated with impaired functioning of the PFC and this relationship was augmented in situation with high stress. These findings are important because they provide new information on obesity-specific changes in brain function associated with neuromuscular control since the knowledge previously focused largely on obesity-specific changes in peripheral muscle capacity. This study can thus be expected to have a positive impact on fundamentally advancing our understanding of how obesity influences the regulation of neuromuscular function, particularly under stress.

**T-P-3035**  
**The role of hunger state in neural response to food cues differs by a history of dieting to lose weight: An ERP Study**  
Emily Feig *Philadelphia Pennsylvania*, Samantha Winter *Philadelphia PA*, Staci Berkowitz *Philadelphia PA*, Brian Erickson *PHILADELPHIA PA*, John Kounios *Philadelphia PA*, Michael Lowe *Philadelphia PA*

**Background:** A history of weight loss dieting has been shown to be a robust predictor of future weight gain, although the mechanisms responsible for this relationship are unclear. One potential factor in propensity towards weight gain is the nature of people's reactions to the abundance of palatable food cues in the environment. Event Related Potentials (ERPs), stimulus-locked averages of EEG waves, are unique in their high level of temporal detail, providing information about immediate preconscious, as well as sustained, neural activity. They have been used to measure response to food cues, however ERP differences based on dieting history have not been tested.

**Methods:** The present study examined ERP response to moderately and highly palatable food images in 65 young adult, non-obese female historic dieters (HDs) and never dieters (NDs). ERPs were recorded in both a fasting and a fed state. The effects of hunger and dieting history were tested on the mean amplitude of 7 epochs ranging from 50-800ms following stimulus presentation.

**Results:** A significant dieting history by hunger state interaction was found in early visual (P1, N1), and late (P3, LPP) ERP components. While ERP response to food cues was larger when fasting than full only in late epochs in HDs, NDs had larger early and late mean amplitudes in the fed than fasting state. Thus, compared with NDs, HDs were less responsive to hunger state in the early stages of food cue processing (i.e., they showed similar brain responses during fasting and fed conditions).

**Conclusions:** Hunger state had distinct effects on neural response to food cues in HDs and NDs. Results support prior research suggesting that individuals prone to weight gain are less responsive to internal cues to eat, at least in preconscious stages of processing. Future research should examine whether ERP food cue response is associated with future weight change, with the ultimate objective of better identifying those who would most benefit from obesity prevention programs.

**T-P-3036**  
**Clinical Trial of Cryolipolysis for Gluteal Fat in Healthy Korean Women for 12 Weeks**  
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**Background:** Cryolipolysis is a new concept to reduce fat since Zeltiq machine had been introduced several years ago. Zeltiq machine, invented by Manstein Dieter, a researcher of photo-medicine group, is used to remove fat through cryolipolysis. Previous studies showed Zeltiq had a pronounced outcome to eliminate central abdominal fat in pig as well as human. Until now, no investigation was done to remove fat in human thigh lesion. Therefore, this study is conducted to investigate the clinical efficacy and safety of cryolipolysis on fat removal of thigh through cryolipolysis in comparison to electrical stimulation.

**Methods:** Fourteen healthy premenopausal volunteered women had been conducted to assess their anthropometrical, social, and cardio-metabolic, and femoral fat amount by computer tomography, and adverse events at initial, 4 week, 12 week visit.

**Results:** There was no significant difference of measured fat amounts between cryolipolysis and frequency electrical treatment for 12 weeks. Minor adverse events such as pain (26.67%), bruise (20%) and numbness (20%) were noted.

**Conclusions:** In conclusion, there was no difference in

efficacy in removal of local fat on thigh between cryolipolysis (Zeltiq) and electrical frequency stimulation. Cryolipolysis was found to be safe for 12 week clinical trial.

**T-P-3037****Early Weight Loss Responders Compared to Non-Responders in a Medical Intervention Program Tend to Have More Emotional and Psychosocial Dysfunction**

Gitanjali Srivastava *Orlando Florida*, Guita Kurd *Celebration Florida*, Cynthia Buffington *Celebration Florida*

**Background:** Studies find that those individuals who are most responsive to a weight loss program are also those who are most likely to sustain their weight loss long-term. Thus, we attempted to identify physical and/or psychosocial characteristics of early weight loss responders (ER) among patients in a medical weight loss program.

**Methods:** 50 participants in a medical weight loss program underwent intensive lifestyle intervention +/- adjunctive pharmacotherapy. Weight loss responders were identified as individuals who, in the first 3 months into the program, lost >5% or more of their initial body weight. Assessments included 1) anthropometrics and body composition 2) health as determined by number of obesity-related medical co-morbidities and laboratory screening and 3) psychosocial status using Beck Depression Inventory-II, Brownell-Stunkard Weight-Loss Readiness Test, and Impact of Weight on Quality of Life-Lite (IWQOL).

**Results:** 40% of participants were ER, having lost >=5% of their initial weight 3 months into the program. Total weight loss for ER vs. non-responders (NR) at 3 months was -17.98 and -3.98 lbs respectively ( $p < 0.0001$ ) and mean % BMI changes from baseline were a respective -7.77% and -1.86%. There were no significant ( $p > 0.05$ ) differences between the groups with regard to initial weight (ER=236.5 vs. NR=252.5 lbs), age (ER=47.2 vs. NR=46.9), or number of co-morbidities (ER=2.45 vs. NR=2.48) and other measurements of health status (insulin, glucose, thyroid, lipids, insulin resistance, hunger eating cues, binge eating). However, ER did tend to be more depressed than the NR patients (BDI-II), to score significantly ( $p = 0.0003$ ) higher for emotional eating, and more poorly ( $p < 0.05$ ) for IWQOL related to physical function and self-esteem.

**Conclusions:** Responders in a medical weight loss intervention tend to have more emotional issues and psychosocial dysfunction compared to non-responders, conditions routinely addressed by our multidisciplinary medical weight management program.

**T-P-3038****Educational Opportunities for Primary Care Clinicians and Specialists to Optimize Care for Individuals with Obesity**

Wendy Cerenzia *Birmingham AL*, Soo Mi Ahn *Plainsboro New Jersey*

**Background:** Weight loss in individuals with overweight/obesity is proven to reduce morbidity, mortality, and healthcare expenditures. Clinicians may benefit from education about weight management to fill practice and knowledge gaps.

**Methods:** A survey was sent to 3,525 US healthcare professionals (HCPs) by CE Outcomes, LLC.

**Results:** Responses were from 643 HCPs (physicians (MD),

nurse practitioners (NP), physician assistants (PA)) practicing in primary care and specialties (endocrinology (ENDO), cardiology (CARD), obstetrics/gynecology (OB/GYN), bariatric (BARI)). Most ENDOs and CARDS (82%) discuss weight at every visit compared to only 58% of primary care practitioners (PCPs); most discussions are during visits for other conditions. A major obstacle in communication is a lack of resources to refer individuals to as indicated by 1/3 of HCPs, except BARIs. While most HCPs agreed they can help individuals achieve a healthy weight, more than 1/3 of PCP MDs, ENDOs, and CARDS indicated low likelihood of success as a notable barrier in addressing weight problems. Only 17% of NPs and PAs were very familiar with obesity guidelines, but 42% indicated their usefulness. Half of HCPs, except BARIs (15%), specified lack of safe and effective pharmacologic therapies as a significant barrier to managing obesity as well as individuals' lack of interest (58%) and lack of adherence to lifestyle recommendations (72%). When prescribing medications, the top patient-related factor HCPs considered was comorbidities and reimbursement was the top medication-related factor.

**Conclusions:** PCPs need education to address weight at every visit. Patient resources may bridge the gap between initial discussions and implementing weight management plans. HCPs lack confidence in themselves and their patients' to succeed, which may improve with greater knowledge. Lack of reimbursement may contribute to lack of patient visits for weight management alone and to pharmacotherapy decisions where BARIs may be able to offer education to other HCPs.

**T-P-3039****Effectiveness of Orlistat in Patients Undergoing Multidisciplinary Lifestyle Weight Loss Intervention in Veteran Administration Greater Los Angeles Healthcare System**

Maria Romanova *Oak Park California*, Sasha Sheftel *Los Angeles CA*

**Background:** In 2006 in response to global obesity epidemic Veteran Administration (VA) National Center for Health Promotion and Disease Prevention introduced nationwide weight loss program called Management Overweight/Obese Veteran Everywhere! (MOVE!) It is a patient-centered intervention delivered by an interdisciplinary team of healthcare providers (primary care, nutrition, psychology, physical therapy and patient education). The program targets long-term lifestyle change to improve nutrition and increase physical activity. Our VA Greater Los Angeles Healthcare System MOVE! Program serves about 1700 veterans annually. **Methods:** After attending a 1 hour nutrition class, completing a questionnaire and obtaining tailored self-help written materials, patients joined 8 weekly group educational sessions, focusing on different aspects of weight control. Upon completion participants had an option to participate in monthly support group, continued education group or receive routine care with a primary care provider. Patients willing to lose more weight received prescription for Orlistat. They were followed by MOVE! providers in group and individual settings on as needed basis.

**Results:** 97 patients completed MOVE! Program and received Orlistat. 83% were male. Average age was 59.8 years. During non-medication phase of MOVE! Program patients lost on average 5.94 lbs. Combined use of education and medication induced 17.97 lb weight loss. After Orlistat was stopped, net weight gain of 2.8 lbs were noted. Patients who subsequently

undergo bariatric surgery were excluded from the analysis.

**Conclusions:** Orlistat is a useful addition to multidisciplinary lifestyle program in VA settings. Observed effects of Orlistat administration were modest and were similar to reported in lifestyle trial literature.

#### T-P-3040

##### Establishment of a Specialized Obesity Care Delivery Model in Central Florida Improves Wellness Outcomes

Gitanjali Srivastava *Orlando Florida*, Guita Kurd *Celebration Florida*, Cynthia Buffington *Celebration Florida*

**Background:** Current obesity care lacks structure, utilizes ancillary support and is rarely embraced by physicians, who are often confronted with significant barriers to addressing the obesity. This leads to meager weight (wt.) loss and treatment failure. Thus, we evaluated wt. loss outcomes in a newly established hospital-affiliated, physician-directed multidisciplinary, individualized obesity care delivery model in Central Florida which serves as a direct referral route for PCPs and specialists.

**Methods:** We retrospectively analyzed outpatient notes of 50 new patients (pts.) who established themselves to a specialized obesity medicine practice in the months of Feb-Aug 2014 and who had at least followed up for >6 consecutive months, identifying demographics, gender effects, and anthropometric changes over time. Treatment combined lifestyle modification with medical management and when required, psychological intervention.

**Results:** Gender distribution was 70% female. Pt. characteristics (mean±SD) were: age 47.0 ±16.4 y; weight 246.1 ±72.8 lbs; BMI 39.3±8.8 kg/m<sup>2</sup>; % body fat 45.5 ±6.3. Pts. had been on at least 2 diets prior to seeking tertiary obesity care and had an average of 2.5 major co-morbidities. 74% were insulin resistant [HOMA]; 12% had Type 2 DM (HbA1c>6.5%); 46% were hypertensive; 48% had dyslipidemia, 38% were hypovitaminD; 44% were depressed (BDI-II). Men were more likely to be insulin resistant, while women were more likely (p<0.05) to be depressed. 94% of pts. required 1 or more wt. loss medication to complement intensive lifestyle change. Wt. loss at 3 and 6 months averaged 9.36 and 16.4 lbs and % changes in BMI a respective -4.38% and -7.71% (p<0.0001).

**Conclusions:** Establishment of hospital-affiliated specialized outpatient obesity centers is likely to improve wt. loss outcomes, obesity-related comorbidities and reduce barriers to addressing obesity. They represent an underscored opportunity to intervene early and effectively for the clinical management of obesity.

#### T-P-3041

##### Expectation of Improvement in Quality of Life with Remission of Diabetes Predicts Improvement in Quality of Life with Weight Loss Interventions

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**Background:** Weight loss improves diabetes and quality of life (QOL) in obese individuals. How patients' initial expectations of these improvements affect actual changes in QOL has not been studied.

**Methods:** We studied 12 obese women with type 2 diabetes enrolled in a 3 arm randomized trial comparing medical weight

loss, adjustable gastric banding, or Roux-en-Y gastric bypass at baseline and after 10% weight loss. We categorized patients' expectation of improvement using the Audit of Diabetes-Dependent QOL question: "If I did not have diabetes, my quality of life would be: the same/a little better ("Same") vs. much better/very much better" ("Better"). We compared the association of baseline expectation (same vs. better) with change in functional status using the 36-Item Short Form Health Survey (SF-36) from baseline using Kruskal-Wallis tests.

**Results:** 9 subjects expected to get better, while 3 expected no change in QOL. Median age (61 vs 48 years, p=0.05) and BMI (38.6 vs. 35.0 kg/m<sup>2</sup>, p=0.03) were higher in the same vs. better group. Overall, there were no significant improvements in physical and mental components of SF-36 at follow-up. Those who expected improvements at baseline were more likely to report improvements in the SF-36 physical component summary scale (+5 vs -7, p=0.01), and the physical functioning subscale (+25 vs. -30, p=0.03).

**Conclusions:** Our findings suggest that baseline expectation of improvement in quality of life with diabetes remission may predict improvement in physical QOL and functional status after weight loss.

#### T-P-3042

##### Feasibility and Efficacy of Obesity Management in a Primary Care Setting: Observations from Real-Life Application

Shari Lefauve *New York New York*, Mary Digiorgi *New York New York*

**Background:** Clinical trials show comprehensive lifestyle intervention for obesity to be successful. No studies have evaluated the process of individualizing intensive behavioral therapy (IBT). This study analyzed outcomes and discussed challenges of implementing IBT in a primary care setting.

**Methods:** Retrospective data from patients under the care of a single practitioner with nutrition training between 2/2014 and 3/2015 (n=20) was reviewed. IBT per 2013 AHA/ACC/TOS guidelines included 500 kcal/day deficit using evidence-based macronutrient-targeted diet, directed physical activity (PA) as well as fruit and vegetable consumption (FV), and self-monitoring applications incorporating individual patient goals. 15 patients completed the 6-month program. Anthropometrics and cardiometabolic measures, and lifestyle behaviors (PA and FV) were included from baseline, 3 and 6 month visits.

**Results:** Subjects were 73% female, mean age 44.6 yrs, with baseline weight 114.8±24.2kg, BMI 40.5±6.0kg/m<sup>2</sup>, waist circumference (WC) 48.1±5.8in. At 3 and 6 months respectively, WC was reduced by -0.8±1.3 and -1.4±2.2in (p=.02), PA increased by 45±50 min and 40.7±29.7 (p=.0002), FV increased by 2.8±3.4 and 1.8±3.2 servings (p=.04). Weight loss was modest at 3 months plateauing by 6 months. Cardiometabolic measures showed clinical but non-statistical improvement.

**Conclusions:** Differences were notable for increased PA, FV, and reduced WC. Weight loss plateau was consistent with former studies. Practitioner burden was great for maintaining visit frequency, providing guidance and resources. However, implementation of IBT can reduce metabolic risk for obese patients if sustained, as well as enhance adjuvant therapy. Improvements observed suggest that IBT in a primary care setting impacts behavior change and central adiposity, which has critical implications for widespread application.

**T-P-3043**

**Fetal Body Composition in Women Who are Overweight and Obese During Pregnancy and Clinical Outcomes – A Prospective Cohort Study**

Cecelia OBrien *North Adelaide South Australia*, Rosalie Grivell *North Adelaide SA*, Jodie Dodd *North Adelaide South Australia*

**Background:** To describe the association between the predictive value of third trimester ultrasound assessment of fetal body composition and maternal and infant clinical outcomes in women who are overweight or obese during pregnancy.

**Methods:** A prospective cohort study nested within the LIMIT randomized controlled trial. Women were recruited between 10+0 and 20+0 weeks' gestation, with a BMI >25kg/m<sup>2</sup>. Fetal body composition (mid thigh lean (MTLM) and fat mass (MTFM), abdominal fat mass (AFM) and subscapular fat mass (SSFm)) were assessed prospectively using ultrasound at 28 and 36 weeks' gestation. Important clinical maternal and fetal outcomes were collected including caesarean section. Chi-square tests for independence were conducted to test for associations between fetal body composition above the 95th percentile and categorical maternal and infant outcomes.

**Results:** There was a significant relationship between fetal body composition at 36 weeks and operative birth for women. In particular, AFM and SSFM above the 95th percentile at 36 weeks were strongly associated with a woman's overall chance of a caesarean section ( $P < 0.05$  for both).

**Conclusions:** For women who are overweight and obese during pregnancy, measures of fetal body composition above the 95th percentile in the third trimester are strongly and significantly associated with a woman's chance of caesarean section. The incorporation of these measures into prediction models for clinical use in the third trimester warrants further investigation and validation in a larger cohort.

**T-P-3044**

**Impact of a Mindful Eating Intervention on Self-Objectification: A Pilot Study**

Andrea Pratt *New York NY*, Alexis Conason *New York New York*

**Background:** This pilot study examined whether a mindful eating intervention is associated with decreased self-objectification among a sample of female participants. Mindful eating focuses on mindfulness skills in addition to bodily sensations such as the physiological sensation of hunger, fullness, and satiety. Self-objectification is associated with disordered eating, negative body image, and depression. Interventions, such as mindful eating, that foster positive body image have been shown to decrease self-objectification among women.

**Methods:** Participants include 6 women ages 27-59 ( $M = 35.57$ ) that engaged in a 9-week mindful eating intervention developed by the study authors. Participants completed the Self-Objectification Questionnaire (SOQ) one week prior to the intervention and in the month following the intervention. Demographic data including race, ethnicity, socioeconomic status, height, and weight were also collected pre and post-intervention. Data was analyzed using a paired samples t-test to compare change in levels of self-objectification pre and post-intervention.

**Results:** There were no significant differences in mean body mass index (BMI) from before the intervention ( $M = 30.75$ ) to after the intervention ( $M = 30.86$ ). There were also no significant differences on SOQ from pre-intervention to post-intervention, although mean scores on the SOQ decreased, ( $M = -3.85$ ,  $SD = 12.50$ ) and post-intervention scores ( $M = -6.33$ ,  $SD = 9.69$ ).

**Conclusions:** Although there were no significant changes in BMI or self-objectification, it is important to note that self-objectification scores decreased following the intervention. In addition, stable BMI may be an indication of a successful intervention in a population reporting a history of consistent weight gains. Further research is warranted due to the small sample size used in the present study.

**T-P-3045**

**Long-Term Effectiveness of Family Based Lifestyle Intervention on Cardiovascular Risk in Childhood Obesity. A 2-year Randomized Controlled Trial.**

Beate Benestad *Tonsberg Vestfold*, Rønnaug Ødegård *Trondheim Norway*, Samira Lekhal *Tonsberg Norway*, Jens Hertel *Tonsberg Vestfold*, Jøran Hjeltnes *Tønsberg Vestfold*

**Background:** We aimed to compare the long-term effectiveness of two family based intervention programs on body composition and cardiovascular risk factors.

**Methods:** Families living in Norway with at least one obese child ( $BMI \geq$  iso-BMI 30) aged 7-12 years and one obese parent were randomized to Summer Camp (SC) for 2 weeks and 4 repetition weekends at a rehabilitation center ( $n=47$ ), or Lifestyle School (LS) including 4 days family education in a specialist health service ( $n=47$ ). All participants were offered monthly primary care follow-up during the study. Clinical and biochemical outcomes were assessed by intention to treat (mixed models) and ANCOVA adjusting for baseline value of dependent variable, respectively.

**Results:** A total of 90 children (50% girls), 46 in SC-group and 44 in LS-group, were included in the analyses. Baseline mean (SD) age was 9.7 (1.2) years, BMI 28.7 (3.9) kg/m<sup>2</sup> and BMI SD score (SDS) 3.46 (0.75). Sixty-four (71%) children attended the 2-year visit. Sixteen (43%) children in the SC-group achieved a reduction in BMI SDS  $\geq 0.50$  at 2-year visit compared to 8 (30%) in the LS-group,  $p=0.31$ . The SC-group had larger beneficial changes (between-group differences) in: BMI; -1.8 (-3.5, -0.2) kg/m<sup>2</sup>,  $p=0.031$ , body fat percentage; -3.0 (-5.3, -0.8) %,  $p=0.009$ , fat mass; -4.0 (-7.7, -0.4) kg,  $p=0.031$ , resting heart rate; -7 (-11, -3) b/m,  $p=0.002$ , physical capacity -distance 6 minute walk test; 43 (16, 69) m,  $p=0.002$ , triglycerides; -0.3 (-0.6, -0.05) mmol/L,  $p=0.028$ , HDL-cholesterol 0.12 (0.02, 0.21) mmol/L,  $p=0.018$ , non-HDL cholesterol; -0.39 (-0.71, -0.07),  $p=0.018$ , BMI SD score -0.22 (-0.49, 0.05),  $p=0.11$ , but the groups did not differ significantly with respect to changes in muscle mass, blood pressure, waist circumference, HOMA-IR or high sensitivity CRP.

**Conclusions:** Family based treatment at a rehabilitation center resulted in a greater reduction in BMI, body fat and various cardiovascular risk factors in children with severe obesity, compared to a community based program.

**T-P-3046****PCP Beliefs and Practices Fall Short in Weight Management**

Christine Beebe *San Diego California*, Jon Kaeuper *Ponte Vedra FL*

**Background:** Primary care providers (PCPs) are expected to address the obesity epidemic in healthcare by screening and talking to patients with weight problems and implementing a treatment plan to improve health outcomes. PCP beliefs and attitudes impact practice behaviors and patient outcomes. Education and practice enhancements can improve PCP confidence and skills to manage weight loss. Assessing PCP practices and beliefs identify opportunities for education and practice modifications that improve interactions and insure optimal weight management efforts.

**Methods:** Primary Care Providers attending a weight management CME activity at one of four Primary Care Network live CME activities in 2014 (n=1451), or a live CME program at ACP in 2015 (n=400), answered assessment questions focused on practice beliefs and attitudes related to treating patients with weight problems.

**Results:** Under 50% of providers measure BMI annually or use BMI to initiate weight discussions. Barriers to meaningful discussions were divided between time (29%), patient adherence (25%), and motivating patients (25%). Once they identify a weight problem 44% would refer to a dietitian and 45% would recommend exercise. If a patient fails with lifestyle therapy, PCPs suggest increasing physical activity (36%). 40% would begin discussions on medication therapy. When selecting weight loss medications, Orlistat or phentermine alone or in combination were the preferred drugs with safety and contraindications identified as their greatest concern (40%). If weight loss slows on medications 42% would increase physical activity, 35% would change the medication and 26% would increase the dose.

**Conclusions:** PCPs implement a low level of weight management interventions and do not use newer medication therapies available. They place a great amount of confidence and value on patient abilities to participate in large amounts of exercise despite admitting that patient non-adherence to lifestyle regimens is largely responsible for lack of success.

**T-P-3047****Piloting an Obesity Decision Aid Tool based on EOSS in Primary Care Practice**

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**Background:** Primary care physicians are the first line of obesity treatment, however, providers can be uncertain about how to address this complex disease. The Obesity Decision Aid (ODA) was developed to offer providers and patients a tool for individualized assessment and treatment of obesity. ODA is a stepped-care model that combines a patient intake questionnaire with the Edmonton Obesity Staging System. A summary report is generated, which includes treatment options, patient assessment results, and clinical guidance. The pilot study documents the utility of the ODA. Performance was assessed by surveys of providers and patients and outcomes, including patient behaviors and weight management knowledge.

**Methods:** Using EMR database search criteria for adults with BMI  $\geq 30$ , eligible patients in an urban primary care practice received outreach letters. After informed consent, patients completed an online questionnaire before the first visit. Questionnaire results were used to develop a summary that was discussed at the first visit. Patients were seen in follow-up visits every two weeks for twelve weeks.

**Results:** Fifty one patients enrolled in the program and 34 are expected to complete. Preliminary data have shown that there is satisfaction with the tool by both the provider team and patients.

**Conclusions:** A decision aid tool to assist in developing an individualized weight management strategy can be useful to both primary care providers and patients and help meet the need for front line obesity treatment.

**T-P-3048****Severity of Obesity and Six-Month Outcomes among Youth in Pediatric Weight Management: POWER Retrospective Cohort Study**

Brooke Sweeney *Kansas City Missouri*, Eileen King *Cincinnati OH*, Erinn Rhodes *Boston MA*, Jared Tucker *Grand Rapids Michigan*, H. Mollie Grow *Seattle WA*, Michele Mietus-Snyder *Washington DC DC*, Lynne Lostocco *Washington D.C.*, George Datto *Wilmington De*, Elizabeth Estrada *CHAPEL HILL NC*, Carolyn Jasik *San Francisco California*, Ihuoma Eneli *Columbus OH*, William Stratbucker *Grand Rapids MI*, Susan Woolford *Ann Arbor MI*, Shelley Kirk *Cincinnati Ohio*

**Background:** Previous studies at individual multi-component pediatric weight management (PWM) programs reported modest improvements in body mass index (BMI) among youth with obesity. The Pediatric Obesity Weight Evaluation Registry (POWER) is a multi-site U.S. data registry that provides a larger aggregate patient population to evaluate health outcomes in PWM programs across the country.

**Methods:** This retrospective cohort study evaluated 6-month change in BMI and examined modifying factors (i.e., demographics, obesity severity) among youth with obesity participating in PWM programs. We analyzed retrospective data of youth with obesity presenting for multi-component PWM from 2009-2010 at 9 POWER sites. Chi-square and multivariable ANOVA were conducted. Programmatic success, defined as change in BMI (% of 95th %ile)  $< 0$ , was evaluated for patients with  $> 1$  follow-up visits (FV) over a 6-month period.

**Results:** This POWER cohort consisted of 5756 patients (ages 2-18), of which 3605 (63%) had FV. Participants were 55% female, 52% white, 28% black, 21% Hispanic, 53% publicly insured, and age  $11.8 \pm 3.4y$  (mean  $\pm$  SD). Weight status was 26% obesity (OB), 36% severe obesity-class 2 (SO2), and 39% severe obesity-class 3 (SO3). Over 6 months, 36% of patients had 1 FV, and 64% had  $> 1$  FV. BMI (% of 95th %ile) change was greater among SO3 ( $-3.5 \pm 0.5$ ) than SO2 ( $-1.2 \pm 0.5$ ) and OB ( $-0.5 \pm 0.5$ ) (all  $p < 0.0001$ ). Youth ages 6-11 had more improvement in BMI (% of 95th %ile) change ( $-2.9 \pm 0.5$ ) than ages 2-5 ( $-0.45 \pm 0.7$ ;  $p=0.02$ ) and ages 15-17 ( $-1.6 \pm 0.6$ ;  $p=0.001$ ). A majority of patients (64%) experienced programmatic success, which was achieved among patients with OB (61%), SO2 (64%), and SO3 (65%). Patients with SO2 and SO3 had more programmatic success with  $> 1$  FV than with 1 FV (SO2: 67% vs. 60%,  $p < 0.05$ ; SO3: 68% vs. 59%,  $p < 0.001$ ).

**Conclusions:** This study found multi-component PWM

programs across the country can be effective short-term for the majority of youth with obesity regardless of the extent of obesity at presentation.

**T-P-3049**

**Texas Childhood Obesity Research Demonstration (TX CORD): Improvement in Primary Care Provider Self-Efficacy and Use of Patient-Centered Counseling to Address Overweight and Obesity after Practice-Based Changes**

Sarah Barlow *Houston Texas*, Meliha Salahuddin *Austin TX*, Deanna Hoelscher *Austin Texas*, Nancy Butte *Houston TX*, Stephen Pont *Austin TX*

**Background:** Recommended behavioral approaches for childhood overweight/obesity (OW/OB) are not widely implemented in primary care. TX CORD provided support to primary care offices to address this problem. Offices in low SES areas received training, changes to the electronic health record (Houston), and clinical tools to guide brief lifestyle counseling during regular office visits. We evaluated perceived self-efficacy and practice behaviors.

**Methods:** Physicians and nurse practitioners (PCPs) at 5 Houston and 6 Austin offices completed questionnaires at baseline (T0, n=40), 12 months (T1, n=30), and 24 months (T2, n=34). Self-efficacy (15 items on 1-4 scale) and frequency of practice behaviors (17 behaviors rated never to always, 0-4 scale) were assessed. Mixed effects linear regression models compared responses between time points.

**Results:** Self-efficacy: confidence increased from T0 to T2 for 7 items: determining OW/OB (3.58 [SD .55] v 3.85 [.66],  $p < .01$ ); interpreting body mass index (BMI) (3.63 [.49] v 3.85 [.36],  $p < .05$ ); identifying (3.00 [.82] v 3.38 [.65],  $p=.01$ ) and counseling (2.85 [.80] v 3.44 [.61],  $p < .001$ ) about OW/OB-related parenting practices; counseling about eating behavior (3.23 [.70] v 3.5 [.66],  $p < .05$ ); and setting behavioral goals (3.00 [.72] v 3.38 [.65]  $p=.01$ ). Practice behaviors: PCPs reported high rates of medical problem evaluation and addressing lifestyle, without significant increase by T2. Frequency of discussion of BMI percentiles with all pediatric children/parents increased (3.15 [.80] v 3.5 [.62],  $p < .05$ ). Low use of patient-centered counseling techniques at T0 increased by T2, including asking permission before discussing lifestyle (1.53 [1.38] v 2.12 [1.34],  $p < .05$ ); asking which lifestyle issues are most important (2.0 [1.3] v 2.76 [.99],  $p < .01$ ); and asking about confidence to change (2.4 [1.24] v 2.97 [.88],  $p=.01$ ).

**Conclusions:** TX CORD primary care practice support was associated with improved PCP self-efficacy and use of patient-centered counseling style.

**T-P-3050**

**The Silent Incidence of Comorbidity Below 35 kg/m<sup>2</sup> in Paediatric Population – 5 Year Experience of a UK Regional Adolescent Bariatric Service**

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**Background:** National guidelines for bariatric surgery in adolescents include: BMI >40 kg/m<sup>2</sup>, or BMI >35 kg/m<sup>2</sup> with co-morbidities. Usually children with BMI <35 kg/m<sup>2</sup> are not extensively investigated or treated in specialist centre. We aimed to identify the incidence of early comorbidities in

patients with BMI <35 kg/m<sup>2</sup>.

**Methods:** We performed a retrospective review of children referred to our obesity clinic (2010-2015). Patients were divided in four groups: BMI >40 (A); 35-40 (B); 30-35 (C); <30 (D). Data, reported as mean  $\pm$ SD and number of cases (%), were analysed.  $P < 0.05$  was considered significant.

**Results:** 140 children were assessed. Ten underwent surgery. Twenty-one with incomplete data and 16 with BMI <30 were excluded; 93 were analysed: 48 (44%) in A, 19 (17%) in B and 26 (24%) in C. Mean age was 13.1 $\pm$ 4 years: A (15 $\pm$ 2.1), B (13 $\pm$ 2.7) and C (12 $\pm$ 3) [ $p=0.0002$ ]. 77% of children in group C had at least one comorbidity with 6 (60%) of 10 that underwent liver USS having steatosis. Incidence of hypertension was similar between A,B and C (64% vs. 53% vs. 41%;  $p=0.2$ ), insulin resistance was higher in A and B (91% vs. 86% vs. 65%  $p=0.0002$ ).

**Conclusions:** In our series, adolescents with BMI 30-35 have high incidence of hypertension and insulin resistance that might justify intensive investigations and early intervention. Older children have higher BMI and co-morbidities. We suggest a tailored approach taking into account the presence of co-morbidities in consideration for more intense management and follow up for these patients.

**T-P-3051-DT**

**Weight Loss in Black and White Women in the POWER-UP Trial**

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**Background:** Numerous 1-2 year weight loss trials conducted in academic medical centers have shown that black women lose approximately 2-3 kg less than their white counterparts. The present report examines the effect of race/ethnicity on weight loss in women with obesity who were recruited and treated in primary care settings as part of the Practice-based Opportunities for Weight Reduction trial at the University of Pennsylvania (POWER-UP).

**Methods:** Weight losses at 6 and 24 months were examined for 170 white women and 131 black women with a mean baseline age of 52 $\pm$ 11.6 years and BMI of 38.5 $\pm$ 4.4 kg/m<sup>2</sup>. (There were no baseline differences between groups.) Data were analyzed using general linear regression models, controlling for age and the effects of treatment condition. (Participants were randomly assigned to usual care, brief lifestyle counseling, or enhanced brief lifestyle counseling. Results for treatment condition have been reported previously and are not examined separately here.)

**Results:** At month 6, black women, compared with white, lost a smaller percentage of initial weight (-2.7 $\pm$ 0.4% vs. -4.4 $\pm$ 0.4%,  $p=0.003$ ), and a smaller percentage of black women lost  $\geq 5\%$  of initial weight (22.9 vs 35.4%,  $p=0.026$ ). At month 24, differences in weight loss were no longer statistically significant (-2.5 $\pm$ 0.6% vs -3.7 $\pm$ 0.5%), but a smaller percentage of black women lost  $\geq 5\%$  of initial weight (19.1% vs. 32.4%,  $p=0.009$ ).

**Conclusions:** As behavioral weight loss treatment increasingly moves to primary care practice in the coming years, further efforts will be needed to ensure that black women achieve clinically meaningful weight loss.

**T-P-3052**

**A White-Light 3D Body Volume Scanner to Assess Body Composition**

Jose Medina-Inojosa *ROCHESTER MN*, Virend Somers *Rochester MN*, Jenkins Sarah *Rochester MN*, Jennifer Zundel *Rochester MN*, Lynne Johnson *Rochester MN*, Francisco Lopez-Jimenez *Rochester MN*

**Background:** Body composition calculations have shown to better predict adiposity-related cardiovascular risk better than the commonly used Body mass index. The White-light 3D Body Volume Scanner (BVI) is a non-invasive device that measures body volume, shapes and sizes. We assessed the hypothesis that volume obtained by BVI is comparable to the volume obtained by air displacement plethysmography (BodPod) (COSMED Concord, CA, USA) and thus capable of assessing body composition and body fat mass.

**Methods:** We compared BVI to BodPod, a validated bicompartamental method that uses pressure/volume relationships under isothermal conditions to estimate body volume. Volume is used to calculate body density (BD) applying the formula  $BD = \text{Body mass}/\text{Volume}$ . Body fat mass percentage is then calculated using the Siri formula  $(4.95/BD - 4.50) \times 100$ . Measurements from both devices were obtained on the same day at Mayo Clinic Dan Abraham Healthy Living Center and a prediction model for total BodPod volume was developed using linear regression based on 80% of the observations (N=971), as follows: Predicted BodPod Volume (L) =  $9.498 + 0.805*(\text{BVI volume, L}) - 0.0411*(\text{Age, years}) - 3.295*(\text{Male}=0, \text{Female}=1) + 0.0554*(\text{BVI volume, L})*(\text{Male}=0, \text{Female}=1) + 0.0282*(\text{Age, years})*(\text{Male}=0, \text{Female}=1)$ . Predictions for BodPod volume based on the estimated model were then calculated for the remaining 20% (N=243) and compared to the measured BodPod volume. All analyses were performed using SAS version 9.

**Results:** In our cohort 39.4% were men, Mean (SEM) age was 41.5(0.41) years, weight 81.6(0.67) kg, BMI was 27.8 (0.20) kg/m<sup>2</sup>. Average difference between BodPod volume measured – predicted by BVI was 0 L, median: -0.4 L, IQR: -1.8 L to 1.5 L. Average difference between Body fat % measured – predicted was -1 %, median: -2.7%, IQR: -13.2 to 9.9, with a correlation coefficient of  $R^2 = 0.9845$ .

**Conclusions:** Body fat mass can be estimated using volume measurements obtained by a white- light 3D body scanner.

**T-P-3053-DT**

**Appendicular Lean Mass and Trunk Lean Mass and the Difference in Resting Energy Expenditure (REE) of African American and Caucasian American Children**

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**Background:** Prior studies have reported that African American (AA) children and adults have lower REE, adjusted for total lean body mass (LBM), fat mass (FM), and bone mass, than Caucasian American (CA) children and adults. The lower REE of AA has been proposed as a factor promoting undue weight gain. Because appendicular lean mass (ALM) is also reported to be greater in AA than CA for any given body weight, and ALM has low EE at rest, we tested the hypothesis that separately accounting for trunk lean mass (TLM, primarily

composed of high EE organs) and ALM would explain the race-associated difference in REE.

**Methods:** We studied a convenience sample of 417 non-obese and obese AA (n=197) and CA (n=220) children, mean age 11.0±3.0y. REE was measured using indirect calorimetry. DXA (Hologic 2000 or 4500) was used to assess body composition. ANCOVAs were performed to examine the differences in REE for AA and CA, accounting for sex, age, height, pubertal stage, total FM, total bone mass, and either for total LBM or for both TLM and ALM.

**Results:** AA had greater ALM than CA ( $+2.3 \pm 0.3$  kg,  $p < 0.001$ ), even after accounting for age, sex, puberty, height, and BMI. When total LBM was in the model, REE adjusted for covariates was  $91.9 \pm 20.2$  kcal/day lower in AA than CA ( $p < 0.001$ ). However, after accounting separately for ALM and TLM, the discrepancy in REE between the groups was no longer significant ( $41.5 \pm 23.9$  kcal/day lower in AA;  $p = 0.083$ ). ALM was not significantly associated with REE in this model ( $p = 0.22$ ), although TLM was ( $p < 0.001$ ).

**Conclusions:** The majority of the disparity in REE between AA and CA can be accounted for by differences in body composition as assessed by DXA and appears largely attributable to differences in appendicular lean mass. Thus the previously reported lower REE of AA does not necessarily provide evidence of a predisposition to weight gain. Elucidating the remaining 40 kcal non-significant difference in REE between AA and CA may require organ-tissue volume and metabolic rate measurements.

**T-P-3054**

**Assessment of Weight Loss with Non-Invasive Selective Radiofrequency Therapy in Overweight and Obese Participants**

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**Background:** Debate exists regarding the efficacy of a non-invasive selective radiofrequency (SRF) therapy for overweight and obesity. This investigation assesses the impact of treatment with an SRF device on waist circumference (WC), total body weight (TBW), and fat mass (FM) in a cohort of overweight and obese individuals.

**Methods:** Investigators performed a single-armed prospective study of overweight and obese individuals who received six weekly treatments with an SRF device. Baseline WC, TBW, and FM were compared to follow-up measurements taken at treatment four, treatment six, and between weeks 4 and 8 post final treatment. Approximately normal distributions were compared using the Paired T-Test and non-parametric distributions were compared using the Wilcoxon Signed Rank Test. Adverse reactions and subject expectations were monitored by weekly survey.

**Results:** A total of 15 participants were enrolled, 15 completed treatments 1 – 4, 13 completed treatments 5 – 6, 12 received a final WC measurement, and 11 received a final body composition measurement. No statistically significant differences were observed for WC, TBW, or FM at treatment 4 (WC: 0.53 (CI: -1.09, 2.15),  $p = 0.493$ ; TBW: -0.8 (CI: -1.89, 0.28),  $p = 0.133$ ; FM: -2.8 (CI: -10.29, 4.68),  $p = 0.435$ ), treatment 6 (WC: 0.57 (CI: -0.52, 1.66),  $p = 0.276$ ; TBW: -1.27 (CI: -2.97, 0.43),  $p = 0.128$ ; FM: -3.47 (CI: -11.67, 4.75),  $p = 0.376$ ), or weeks 4 – 8 post-treatment (WC: 0.94 (CI: -0.44, 2.32),  $p = 0.162$ ; TBW: -0.82 (CI: -3.38, 1.75),  $p = 0.496$ ; FM: 3.06,  $p = 0.05$ ) respectively. A nearly statistically significant

gain in FM (3.06 lbs) was observed at weeks 4 – 8 post-treatment ( $p=0.05$ ). Subjects reported tenderness, swelling, and firming; no serious or unexpected adverse events were reported. Survey responses indicated that subjects felt “unsure” (70.2%) and “not confident” (19.4%) that they would lose belly fat as a result of treatment.

**Conclusions:** Our findings did not demonstrate an impact of selective radiofrequency therapy for overweight and obesity.

#### T-P-3055

##### **Baseline environmental and affective predictors of dietary lapse frequency early in behavioral weight loss treatment**

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**Background:** Frequency of dietary lapses (i.e., discrete episodes of dietary inadherence), particularly early on in treatment, is an important determinant of weight loss. However, no baseline predictors of lapses have been identified. We tested the theory-driven hypothesis that eating in response to affect, susceptibility to the food environment, and food cravings predicted frequency of dietary lapses early in a behavioral weight loss intervention (BWL).

**Methods:** The current study administered self-report measures to overweight (BMI 27-50 kg/m<sup>2</sup>; N = 158) participants before entry into a BWL. One measure of emotional eating, two measures of susceptibility to environmental cues, and two measures of food cravings were used. Ecological momentary assessment was used to record dietary lapses in weeks 2-3 of the BWL.

**Results:** A correlational analysis indicated that baseline susceptibility to affect ( $r = .21$ ,  $p = .007$ ) and both measures of environmental food cues ( $rs = .21-.23$ ,  $ps = .01-.003$ ), as well as both measures of food cravings ( $rs = .19$ ,  $ps = .019$ ) were prospectively associated with frequency of dietary lapses at week 3 of the BWL. For example, when dichotomized, those with higher (+1 SD) susceptibility to the food environment lapsed 10.05 times on average compared to 6.45 times for those with lower (-1 SD) susceptibility to the food environment.

**Conclusions:** Results suggest that baseline susceptibility to affect, environmental food cues, and food cravings are associated with the likelihood of lapsing from one's diet. The ability to predict likelihood of lapsing could have important implications for tailoring treatment in BWL, especially early on in treatment. For example, those high in environmental susceptibility may benefit from an early focus on reducing food cues in the environment or targeted strategies for resisting tempting food, while those with high emotionality may benefit from early interventions focused on reducing emotional eating.

#### T-P-3056

##### **Comparison of Changes in Body Composition After Medical Versus Surgical Weight Loss**

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**Background:** Bariatric surgery leads to rapid and significant weight loss compared to medical weight loss (MWL). In

addition to the loss of fat mass (FM), this rapid weight loss can include up to 1/3 of lean body mass (LM). Whether the method of weight loss contributes to the extent of LM loss is unclear.

**Methods:** We compared effects of three weight loss interventions [MWL, adjustable gastric banding (AGB), or Roux-en-Y gastric bypass (RYGB)] on changes in body composition at the time of 10% weight loss in a randomized trial. 15 subjects with type 2 diabetes and an employer-based health plan were randomized 1:1:1; stratified by BMI (30-34.9 and 35-40 kg/m<sup>2</sup>). Data are presented on subjects who completed the study (N=12).

**Results:** All subjects were women and 75% were African American. Mean age was lower in the AGB vs. the RYGB and MWL arms (46 vs. 54.3 and 51.5 years). The two surgical arms (AGB and RYGB) achieved a significantly greater weight loss compared to the MWL arm (-9.78, -9.97 vs -6.12 respectively) at a faster rate (2.77, 2.51 vs 7.47 months respectively). There was no bone loss at final analysis across the arms. Total FM and LM decreased in all arms but did not vary significantly by arm. Total FM to LM ratios decreased in MWL and RYGB arms but remained the same in AGB arm. RYGB arm lost the most FM while AGB arm lost the most LM; changes were not statistically significant across arms.

**Conclusions:** Our findings suggest that changes in body composition are similar across weight loss methods in the setting of equivalent short-term weight loss. There is a suggestion that AGB may preferentially lead to a greater total LM loss compared to RYGB or MWL. Studies with a larger and more diverse sample and longer follow up are warranted.

#### T-P-3057

##### **Effects of a low glycemic load diet on blood pressure during weight maintenance in adults with obesity**

Amy Goss *Birmingham Alabama*, Barbara Gower *Birmingham Alabama*

**Background:** Insulin acts through multiple mechanisms to influence blood pressure (BP) including enhancement of renal sodium reabsorption. Sodium restriction is commonly recommended to individuals with hypertension, but diets designed to limit insulin secretion may be as effective at lowering BP by increasing sodium excretion. We tested the hypothesis that circulating insulin is associated with systolic and diastolic BP independent of total fat mass and that consumption of a relatively low glycemic load (GL) diet will result in decreased insulin and systolic and diastolic BP under weight maintenance conditions in healthy adults with obesity.

**Methods:** Participants were 69 healthy men and women with obesity. Fasting insulin, BP and body composition by DXA were assessed at baseline and after 8 weeks of a eucaloric diet intervention. Participants were provided all food and randomized to either a low GL diet (<45 points per 1000 kcal; n = 40) or high GL diet (>75 points per 1000 kcal, n = 29) for 8 weeks.

**Results:** At baseline, fasting insulin was associated with systolic (Std  $\beta=0.39$ ,  $p<0.01$ ) and diastolic (Std  $\beta=0.28$ ,  $p=0.05$ ) BP independent of total body fat mass, ethnicity, and sex in all participants combined. In both men and women consuming the weight-maintaining low GL diet, insulin was significantly decreased after 8 weeks (-8%,  $p<0.05$ ). Men who consumed the low GL diet had significantly lower systolic (-5%,  $p<0.05$ ) and diastolic (-6%,  $p<0.05$ ) BP. There were no significant changes in insulin or BP following consumption of the high GL diet.

**Conclusions:** Independent of fat mass, circulating insulin may

be linked to elevated BP among healthy adults with obesity. By limiting insulin secretion, consumption of a relatively low GL diet may reduce diastolic and systolic BP in the absence of significant weight loss.

**T-P-3058****Establishing Energy Equilibrium in the Clinical Research Setting: Protocol Design and Outcome Features**

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**Background:** Establishing a state of energy balance with weight stability is an important component of evaluating a wide range of metabolic processes. Limited information is available on how to experimentally achieve this state of energy balance both through weight measurements and accurate estimates of metabolizable energy intake (MEI). The aim of this study was twofold: to develop a protocol for creating an energy equilibrium state in healthy adults living on a metabolic unit; and to establish guidelines for MEI requirements based on resting energy expenditure (REE).

**Methods:** Baseline maintenance energy requirements were initially estimated as 1.15 times 24 hr energy expenditure measured in a respiratory-chamber indirect calorimeter. A 5-day iterative stabilization period then followed with subjects maintaining body weight within  $\pm 1$  kg entered into a second 5-day energy balance ( $\Delta E$ ) period. 14 subjects completed the study and maintained constant MEI during the  $\Delta E$  period. Ventilated-hood indirect calorimetry was used to measure baseline REE and REE was also calculated using several widely used prediction equations.

**Results:** The body weight CV ( $\pm$ SD) during the 5-day  $\Delta E$  period was 0.39% (range 0.2-1.1 kg). MEI during this period was well-correlated with total energy expenditure (TEE) measured over a similar time frame with doubly-labeled water ( $R^2/p$ -value: 0.69/ $<0.01$ ; MEI/TEE,  $1.08 \pm 0.13$ ). There were good correlations between MEI and measured ( $0.67/ $<0.01$ ) and calculated ( $0.80$ - $0.86$ /all  $<0.001$ ) REE, and respective rounded MEI/REE ratios were  $1.6 \pm 0.2$  and  $1.4$ - $1.5 \pm 0.1$ .$

**Conclusions:** Energy equilibrium with a body weight CV of  $<0.5\%$  can be achieved over 2-4 weeks on a metabolic unit with MEI requirements during this period predicted as 1.4-1.6 times measured or calculated baseline REE.

**T-P-3059****Examining the Relationship of YFAS Scores to Weight Loss in Bariatric Surgery**

Gregory Petersen *Chicago Illinois*, Rachel Gabelman *State College PA*

**Background:** We have observed a low rate of distress being endorsed by participants having 3 or more symptoms of food addiction (FA). In our sample, 49 of 90 participants (54%) endorsed 3 or more symptoms of FA. Of those endorsing 3 or more symptoms, only 17 (19%) also endorsed experiencing distress. Using distress as part of the criteria, 32 of 49 participants endorsing significant (3 or more) symptoms of FA are categorized as not addicted. We believe this produces a potential confound for studies correlating the YFAS with outcome that could be rectified by dropping the distress component.

**Methods:** Ninety participants completed the YFAS prior to undergoing bariatric surgery for weight loss. They were categorized as food addicted (FA) or not food addicted (NFA) based on the YFAS using both the instructed scoring and then again dropping distress from the criteria. Weight was assessed post surgery at 3 mo, 6 mo, 1 yr and 2 yrs post. The outcome variable was the % of total body weight loss (TBWL) at each time period. The TBWL of FA and NFA participants were compared at each follow up period using a two sample t-test assuming unequal variances.

**Results:** With distress included, TBWL at 3 mo was 17.2% for FA (n=17) and 17.0% for NFA (n=73) ( $p=.45$ ) TBLW at 6 mo was 24.2% for FA (n=16) and 24.9% for NFA (n=69) ( $p=.38$ ). When distress was dropped, TBLW at 3 mo was 16.5% for FA (n=49) and 17.8% for NFA (n=41) ( $p=.09$ ). TBLW at 6 mo was 23.2% for FA (n=48) and 26.5% for NFA (n=37) ( $p=.005$ ). One year data was incomplete at the time of submission. It will be presented at the time of the conference.

**Conclusions:** The YFAS as scored presently categorizes many patients with significant symptoms of addiction as not addicted, diminishing its utility as a clinical tool. We propose dropping the requirement of distress for categorizing patients as addicted. Doing so resulted in predictive power for outcome after weight loss surgery that was lost when distress was included.

**T-P-3060****Genetic Obesity Risk and Appetite in Adolescents**

Leora Benson *Baltimore Maryland*, Katherine Pryor *Durham NC*, Barbara Lohse *University Park PA*, Allan Geliebter *NY NY*, Wendy Chung *New York NY*, Susan Carnell *Baltimore Maryland*

**Background:** Common obesity-associated genetic variants have been identified via genome-wide association studies, and many of the genes involved are expressed in the brain. However, relatively little is understood about the behavioral mechanisms by which these variants influence body weight.

**Methods:** We genotyped weight-associated SNPs in FTO (rs9939609), MC4R (rs17782313), NEGR1 (rs2815752) and TMEM18 (rs6548238) in 35 adolescents between 14 and 19 y old (20 F; 15 M), with a mean BMI percentile of  $64 \pm 28$  (range: 12-99), recruited for varying familial (i.e. both genetic and environmental) obesity risk based on maternal weight. We assessed subjective appetitive responses to food and non-food words using a novel computer paradigm, as well as ad libitum intake in a laboratory meal. Participants also completed the Satter Eating Competence Inventory, a questionnaire measuring habitual self-regulation of intake.

**Results:** Higher genetic risk scores based on the number of risk alleles in all four variants were associated with greater 'wanting' responses to food words compared with non-food words in the computer paradigm ( $r=0.37$ ;  $p=0.030$ ). Analyses of individual variants revealed that the FTO risk allele was associated with lower scores on questionnaire measures of intake self-regulation ( $p=0.044$ ); and the MC4R risk allele was associated with greater ad libitum intake of high energy-density foods ( $p=0.036$ ).

**Conclusions:** Our results suggest that common obesity-associated genetic variants influence weight via multiple appetitive endophenotypes, including a heightened subjective desire to eat when exposed to simple food word cues. This genetic effect on appetite was evident even in this small sample. Targeted behavioral and environmental interventions may help to limit the impact of increased appetitive responses

and diminished self-regulation of intake in those at raised familial/genetic obesity risk.

**T-P-3061****GIP modulation of insulin release after oral dextrose intake in healthy men**

Ali Iranmanesh *Salem Virginia*, Donna Lawson *Roanoke Virginia*, Johannes Veldhuis

**Background:** Pancreatic beta-cell stimulation of insulin release after oral nutrient intake is believed to be modulated by incretins. Studies of glucose regulatory properties of incretins have for the most part focused on GLP-1, with physiologic role of GIP being sporadically investigated. The purpose of this study was to explore the role of GIP, per se and jointly with GLP-1, on insulin release after oral dextrose ingestion in healthy men.

**Methods:** Five men (age: 19-60 years, BMI: 25-31 Kg/m<sup>2</sup>) were studied after an overnight fast and ingestion of 75 grams of dextrose solution. Sessions started at 0800-0900 hour and continued for 6.5 hours, with blood collected at 10-min intervals for the measurements of glucose, GLP-1, GIP, and insulin concentrations. Cross-correlation, multiple stepwise regression, and ROC procedures were used for data analysis.

**Results:** Insulin release after oral dextrose ingestion maintained significant cross-correlation with glucose, GLP-1, and GIP at respective lag spectrums of 0-90 (r: 0.39-0.89), 0-90 (r: 0.35-0.86), and 0-80 (r: 0.31-0.92) minutes, with maximum correlations at lag times of 20 min for glucose (r: 0.89), 20 min for GLP-1 (r: 0.86), and 10 min for GIP (r: 0.92). Multiple regression analysis revealed a strong correlation between determining variables (GIP/GLP-1) and insulin (R: 0.93; R<sup>2</sup>: 0.86). Removal of GLP-1 in the process of stepwise regression reduced R<sup>2</sup> by 0.035, leaving GIP as the predominant contributing factor at R<sup>2</sup> value of 0.82. Per ROC curve GIP was a stronger predictor of insulin release at respective true positive, false positive, and accuracy rates of 1.0, 0.05, and 97.

**Conclusions:** Results of this study disclose GIP as a stronger predictor of glucose-induced insulin release. The GIP R<sup>2</sup> of 0.82 and the R<sup>2</sup> change of 0.035 after removal of GLP-1 indicate that 82% of changes in insulin release after oral glucose intake are accounted by increases in GIP, as opposed to 3.5% for GLP-1. Results in this study need to be confirmed in a larger cohort.

**T-P-3062****Glucose Excursions Influences Hunger and Food Intake in Free-Living Lean and Obese Individuals.**

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**Background:** Obesity is a serious health problem that can be ameliorated through diet and exercise. Both the rapidity of the decline in blood glucose as well as its decrease into the hypoglycemic range are thought to provoke hunger and increase food consumption. However, little is known about the relationship of hunger and food intake with circulating glucose profiles in healthy free-living lean (L), and obese (OB) individuals.

**Methods:** To evaluate whether changes in glucose levels can impact subsequent food intake and hunger, 8 OB (7F/1M, age

44±3, BMI 33.7±0.7, A1c 5.1±0.1) and 5 L (4F/1M, age 25±3, BMI 23.1±1.0, A1c 4.9±0.1) subjects wore a continuous glucose monitor (CGM, Dexcom) for up to 5 days while maintaining a food diary of preprandial hunger ratings (on a scale of 1-10, 1-not at all and 10-very hungry) and food items consumed.

**Results:** Self-reported hunger ratings (L=6.1±0.2 and OB=5.8±0.2) and daily caloric intakes (L=3504±993 vs OB=2306±340 kcal) were not statistically different between the groups. The mean amplitude of glycemic excursions (MAGE) measured by CGM was similar in both groups. While the mean glucose peaks prior to each meal were higher in the OB group (L=114±2 mg/dL and OB=122±3, P<0.05), there was no difference in the nadirs (82±2 and 84±2 mg/dL; P=NS). In both OB and L groups, glucose peaks (p=0.20, P<0.01) and decrements (p=0.25, P<0.001), but not nadirs (P=NS) correlated positively with subsequent hunger ratings. Hunger ratings, however, were positively associated with the caloric and fat intake per meal in OB subjects (P<0.05).

**Conclusions:** These results suggest that glucose peaks and decrements, rather than nadirs, influence perception of hunger. Hunger may particularly promote the intake of fat in obese subjects. Our findings suggest that daily glucose excursions modulate hunger in both obese and lean free-living individuals, which in turn might promote consumption of calorie-dense meals to a greater extent in obese individuals.

**T-P-3063****Higher Dietary Protein Intake Preserves Lean Body Mass, Lowers Liver Lipid Deposition and Maintains Metabolic Control in Subjects with Fatty Acid Oxidation Disorders**

Melanie Gillingham *Portland Oregon*, Annie Behrend *Rochester MN*, Dietrich Matern *Rochester MN*, Dale Schoeller *Madison WI*, Cary Harding *Portland OR*, Jonathan Purnell *Portland Oregon*

**Background:** As part of our ongoing investigations of the role of abnormal mitochondria function among patients with inherited long-chain fatty acid oxidation disorders (FAOD) on energy utilization, body composition, and glucose metabolism, we have demonstrated that subject with FAOD fed a standard-of-care chronic low-fat, high-carbohydrate diet (CHO) have increased percent body fat compared to normal controls.

**Methods:** To determine if diet macronutrient content might contribute to this altered body composition, we randomized FAOD subjects to either a CHO diet (n=6) or to a high protein (PRO) diet with a whey protein supplement (Beneprotein) (n=7). At baseline and the end of the 4 month feeding period, subjects underwent assessments of body composition by DEXA, tissue lipid deposition by MRI/MRS, and energy expenditure.

**Results:** At the end of the study, FAOD patients randomized to PRO diet had an increase in lean body mass compared to a decrease in lean mass in the patients on the CHO diet (P=0.02 for between group comparison). Fat mass and measures of total and resting energy expenditure were not different, although protein oxidation was significantly higher on the PRO than CHO diet (P=0.02). There was no significant change in intramyocellular lipid between groups but intrahepatic lipids trended lower in the PRO diet group (P=0.08). Short-chain acylcarnitine levels were higher while long-chain acylcarnitines were not different after a PRO meal compared with the CHO meal (P<0.05).

**Conclusions:** The high PRO diet with a whey supplement preserved muscle mass despite increased protein oxidation and

without deterioration in metabolic control compared to a high-carbohydrate diet in subjects with FAOD. We also show that FAO is not a prerequisite to demonstrate reductions in intra-hepatic lipids during high PRO feeding.

#### T-P-3064-Withdrawn

#### T-P-3065

##### Impaired Cardiac Autonomic Nervous System Function is Associated with Hypertension and Higher Systolic Blood Pressure Independent of Adiposity in Children and Adolescents

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**Background:** Impaired cardiac autonomic nervous system function and obesity are associated with higher systolic blood pressure (SBP) in adults and children. Whether sympathetic nervous system activity influences SBP independent of adiposity in youth has yet to be evaluated.

**Methods:** We examined the cross-sectional association of heart rate variability (HRV) with hypertension status and SBP among children and adolescents (n = 188; 103 female; 6-18 years old) ranging from normal weight to severe obesity. Seated blood pressure was measured in triplicate using an automated cuff system. Pre-hypertension (SBP percentile  $\geq 90$ th -  $< 95$ th) and hypertension (SBP percentile  $\geq 95$ th) were defined by age-, sex-, and height norms. HRV was measured using the SphygmoCorTM MM3 system and analyzed with different time- and frequency-domains which reflect various aspects of autonomic nervous system activity. Total body fat was measured via dual-energy X-ray absorptiometry.

**Results:** Logistic regression models demonstrated that lower values in all of the time-domain HRV measures (e.g. mean R-R interval length, standard deviation between R-R intervals, the number of adjacent N-N intervals over 50ms) and larger low frequency : high frequency ratio were significantly associated with higher odds of being pre-hypertensive / hypertensive independent of total body fat (p<0.05). In linear regression analysis, lower time-domain, but not frequency-domain, HRV measures were significantly associated with higher SBP independent of total body fat (p<0.05).

**Conclusions:** These data suggest that impaired cardiac autonomic nervous system function, at rest, is associated with higher odds of being pre-hypertensive / hypertensive and higher SBP independent of adiposity in children and adolescents. Whether reductions in sympathetic modulation of cardiac function reduce blood pressure in obese youth independent of weight loss requires further investigation.

#### T-P-3066-DT

##### Lower Triglycerides in African American Women Compared with White Women: Insight from Plasma Free and Esterified Fatty Acid Composition

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**Background:** Triglycerides (TG) levels are related to cardiometabolic disease risk. Reduced intracellular TG synthesis is related to an increase in the metabolites involved

in lipotoxicity (i.e., FFA Acyl-CoA, diacylglycerides and ceramides) that increase disease risk. African Americans (AA) have lower circulating and intracellular TG than Whites (W), but greater disease rates. While it is known that fewer TG accumulate in, and are secreted from the livers of AA than W, the etiology of presumably lower intracellular TG synthesis in AA is largely unstudied.

**Methods:** We measured the composition and product-precursor ratios of plasma free (FFA) and total esterified (EFA) fatty acids as indexes of fatty acid metabolism in AA(n=125) and W(n=80) women using GC-MS. These indexes were calculated: de novo lipogenesis(DNL)=16:0/18:2n-6, Stearoyl-CoA Desaturase-1(SCD-1), SCD-1 C16=16:1n-7/16:0, SCD-1 C18=18:1n-9/18:0, Elongase-6(Elovl-6)=18:0/16:0, Elongase-5(Elovl-5)=22:6n-3/20:5n-3,  $\Delta 5$ -desaturase=20:4n-6/18:3n-6 and  $\Delta 6$ -desaturase=18:3n-6/18:2n-6.

**Results:** Total FFA (AA=0.76 $\pm$ 0.02, W=0.75 $\pm$ 0.03 mmol/L, p=.86) were similar, while total TG (AA=80 $\pm$ 3, W=127 $\pm$ 9 mg/dL, p<.001) and total EFA (AA=8.4 $\pm$ 0.2, W=10.4 $\pm$ 0.3 mmol/L, p<.001) were lower in AA. Indexes of DNL, SCD-1, Elovl-6 and Elovl-5 were consistent with lower enzymatic activity in FFA (representative of adipose tissue) and EFA (representative of the liver). Indexes of  $\Delta 5$  desaturase and  $\Delta 6$  desaturase activity were also different in AA and W women in FFA, but not EFA. In EFA, ethnicity and indexes fatty acid enzymatic activity independently predicted TG without interaction.

**Conclusions:** We conclude that indexes of DNL and essential fatty acid metabolism showed reduced levels in plasma FFA and total EFA in AA compared with W women suggesting lower intracellular TG synthesis in AA women. Therefore, lipotoxicity related metabolites should be investigated for a relationship with increased cardiometabolic disease risk in AA women due to lower TG and lack of associated risk.

#### T-P-3067-DT

##### Non-Glycated Hemoglobin A0 Mediates the Relationship between Glucose and Hemoglobin A1C: A Study of Hemoglobin A Derivatives in African American and White Women

Bernard Miller *Saint Louis Missouri*

**Background:** The relationship between glucose and hemoglobin (Hb) A1c% (i.e., %Hb A0 glycated by glucose) is different in African Americans (AA) compared with Whites (W). While total Hb A concentration has been used to correct for ethnic differences in A1c%, non-glycated Hb A (A0) has not. We hypothesized that ethnic differences in A0 account for ethnic differences in the glucose-A1c relationship.

**Methods:** A0 (non-glycated Hb), A1a (glucose-6-phosphate and fructose-1,6-bisphosphate glycated Hb), A1b (pyruvate glycated Hb) and A1c were determined in the NIH Clinical Center Department of Laboratory Medicine using Bio-Rad Variant II, Ion-exchange HPLC.

**Results:** In our AA (n=33) and W (n=28) female participants matched on body composition (BMI AA=33 $\pm$ 1, W=32 $\pm$ 1kg/m<sup>2</sup>, body fat AA=44 $\pm$ 1, W=44 $\pm$ 1% and visceral fat AA=0.8 $\pm$ 0.1, W=1.0 $\pm$ 0.1kg, P=NS), glucose(AA=89 $\pm$ 1, W=95 $\pm$ 2mg/dL, p=.01) and A0(AA=10.4 $\pm$ 0.1, W=11.2 $\pm$ 0.1mg/dL, p<.001) and A1c(AA=0.67 $\pm$ 0.01, W=0.73 $\pm$ 0.01mg/dL, p<.001) were lower in AA, while A1c(AA=5.7 $\pm$ 0.1, W=5.7 $\pm$ 0.1%, p=.69) was the same. A1a (AA=0.11 $\pm$ 0.01, W=0.08 $\pm$ 0.01mg/dL, p=.01) and A1b (AA=0.14 $\pm$ 0.01, W=0.18 $\pm$ 0.01mg/dL, p<.001) were higher

and lower, respectively, in AA than W women. Glucose was directly related to A1c (adj  $r=0.45$ ,  $p<0.001$ ) and A0 (adj  $r=0.49$ ,  $p<0.001$ ) with ethnicity as a predictive factor for both dependent and mediating variables. When A1c was regressed on glucose and A0 simultaneously (adj  $r=0.66$ ,  $p<0.001$ ), the relationship between glucose and A1c was significantly reduced and ethnicity was no longer significant.

**Conclusions:** Our results showed the relationship between glucose and A1c was mediated by A0 independent of ethnicity. A0 glycation with glucose was the same due to ethnic differences in A0 and glucose, suggesting that A1c% is clinically equivalent in both groups. Correction of A1c for total Hb A is insufficient presumably due to differences in A0 'glycation' with other reducing sugars. Ethnic differences in A1a and A1b suggest that glycolysis is different in AA and W women.

#### T-P-3068

##### **Non-Hematopoietic Effects of Endogenous Erythropoietin on Lean Mass and Body Weight Regulation May Act in Opposing Directions in Men and Women**

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**Background:** Erythropoietin (Epo) has been found to have gender modulated responsiveness and non-hematopoietic functions in rodents including effects on body weight and glucose regulation. It is not known if similar effects occur in humans.

**Methods:** Participants were 109 full heritage Pima Indians (55% male) from a larger study on our clinical research unit designed to understand the causes and complications of obesity and type 2 diabetes mellitus. Seventy-nine subjects had follow up data for weight ( $4.3\pm 1.9$  yrs). Plasma concentrations of Epo, leptin, and adiponectin; body composition; 24hour energy expenditure measured in a whole room calorimeter (EE); oral glucose tolerance and weight change were assessed.

**Results:** Epo, adjusted for differences in storage time, hemoglobin, and creatinine, was positively associated with EE ( $r=0.26$ ,  $p=0.007$ ) and sleeping EE ( $r=0.29$ ,  $p=0.003$ ), fat free mass ( $r=0.25$ ,  $p=0.01$ ), fat mass (FM;  $r=0.25$ ,  $p=0.008$ ), fasting insulin ( $r=0.27$ ,  $p=0.006$ ), but not 2-hour insulin ( $r=0.16$ ,  $p=0.09$ ), fasting glucose ( $r=-0.004$ ,  $p=0.96$ ), or 2-hour glucose ( $r=-0.01$ ,  $p=0.9$ ). In a multivariate model adjusted for the determinants of EE, Epo was not an independent predictor of EE ( $p>0.05$ ). Epo was positively associated with leptin in women ( $\rho=0.36$ ,  $p=0.01$ ), but not in men ( $r=0.02$ ,  $p=0.9$ ), independent from FM. Epo and adiponectin were not associated ( $r=0.01$ ,  $p=0.9$ ). The association of Epo with % weight change per year was in opposing directions (interaction:  $p=0.002$ ) in men ( $r=-0.35$ ,  $p=0.02$ ) versus women ( $r=0.37$ ,  $p=0.02$ ), after adjusting for covariates.

**Conclusions:** Epo concentration was not an independent determinant of EE or SMR. In women, higher Epo concentrations were associated with higher leptin concentrations, independent from FM. Epo concentrations were negatively associated with weight change in men and positively so in women. These data indicate that non-hematopoietic Epo action may be modulated by sex hormones, and, in women, Epo action may either mediate or be affected by leptin resistance.

#### T-P-3069

##### **Packaged Foods and Weight Loss in a Medically-Supervised Weight Loss Program**

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**Background:** Meal replacements and other packaged food options are often a component of commercial weight loss programs; however, little information is available on how their use impacts patient outcomes. The objective of this analysis is to assess how weight outcomes and behavior data differ between very low calorie diets (VLCDs) that do or do not incorporate packaged food items.

**Methods:** A retrospective chart review over a 6-month period was performed for patients that self-selected one of two daily menu options at a medically-supervised commercial weight loss program. The dietary interventions consisted of a packaged food item daily menu plan (PF) or a self-selected food-based meal plan (FB). Patients who changed menu plans over the course of treatment were excluded from analysis. Weight loss and behavior were assessed in pounds and encounters, respectively. Differences between PF and FB patient outcomes were examined using the Mann-Whitney U Test.

**Results:** A total of 7,951 patient charts were retrospectively reviewed, 148 patients who changed menu plans were excluded, and 7,803 patients were included in the final analysis (PF=184, FB=7,619). There were no statistically significant differences in the underlying distributions of weight loss ( $p=0.914$ ) or encounters ( $p=0.699$ ) of patients administered the PF or FB meal plans. Patients on the PF meal plan lost a median 12.6 lbs; whereas, patients on an FB meal plan lost a median 11.7 lbs. There were no differences in the median number of encounters recorded for PF and FB meal plan patient groups (PF: 6 encounters; FB: 6 encounters).

**Conclusions:** Our data suggest that the evaluated packaged food menu plan demonstrates similar weight loss compared to the food-based menu option in patients of a medically-supervised weight loss program. Future research of the evaluated packaged food menu plan would benefit from a non-inferiority analysis of weight loss and encounters between interventions.

#### T-P-3070-DT

##### **Reduction of Fatty Liver After Short-Term Isocaloric Fructose Restriction in Children with Metabolic Syndrome Correlates with Improvement in Insulin Dynamics**

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**Background:** The cause of insulin resistance in metabolic syndrome remains controversial. Ectopic compartmentalization of liver fat is associated with insulin resistance, but proving causation remains elusive.

**Methods:** Obese Latino and African-American children ( $n=36$ , ages 9-18; BMI z-score  $2.3\pm 0.3$ ;  $46.4\pm 5.1\%$  fat by DXA), who were high dietary sugar consumers (fructose intake  $>50$  g/d), had all meals provided for 9 days with the same energy and macronutrient composition as their standard diet, but with

fructose content reduced from 12% to 4%, and replaced by complex carbohydrate. Subjects were weighed daily and diets adjusted to maintain baseline weight. A 2-hour oral glucose (G, mg/dL) tolerance test (OGTT) with insulin (I,  $\mu\text{U/mL}$ ) and c-peptide (CP, ng/mL) levels was performed on Days 0 and 10. HOMA-IR, Composite Insulin Sensitivity Index (CISI), glucose (GAUC) and insulin (IAUC) area under the curve were computed. Liver fat was measured with 3T MR spectroscopy, obtained from a 20 cc single voxel. Signals were respiratory-motion and T2-corrected, and fat fractions (lipids/(lipids+water)) generated. Results were adjusted by ANCOVA for minor weight loss ( $0.9 \pm 1.1 \text{ kg}$ ,  $p < 0.001$ ).

**Results:** Reductions in fasting G (5.1%), I (35%), CP (24.4%), HOMA-IR (40.6%), GAUC (6.6%), and IAUC (36.5%) were noted, while CISI increased (53.1%) after 9 days of fructose restriction ( $p < 0.001$ ). Liver fat reduced by 22% ( $p < 0.001$ ). Liver fat positively correlated with I, HOMA-IR, CP, and negatively with CISI on both Day 0 and Day 10 ( $p < 0.05$ , Spearman). Change in liver fat over the 10 days positively correlated with changes in I and HOMA-IR ( $p < 0.05$ , Spearman).

**Conclusions:** Isocaloric fructose restriction for 9 days reduced liver fat and improved serum measures of insulin sensitivity in children with metabolic syndrome irrespective of weight loss. Changes in liver fat correlated with changes in insulin sensitivity, suggesting directionality — fructose drives liver fat, which drives insulin resistance.

#### T-P-3071

##### Relationship Between Free 25(OH)D and Adipocytokines in Obese and Normal Weight Children

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**Background:** Despite the evidence of hypovitaminosis D in obese children, there is considerable uncertainty on the accuracy of quantifying total 25(OH)D as a biomarker of vitamin D status. Free or unbound 25(OH)D is considered active and recently been recommended as a potentially better marker of vitamin D status. There are no reports on the potential role/associations of free 25(OH)D with obesity-related cardiometabolic risk factors in children. The study determined free 25(OH)D levels in children in relation to biomarkers of obesity-related cardiovascular disease (CVD).

**Methods:** As part of a larger study, 20 children (8 obese and 12 normal weight, mean age (SD): 15.05 (2.21) years were considered in this pilot report. Free-25(OH)D was measured using an enzyme linked immunoassay and total 25(OH)D was measured using liquid chromatography- tandem mass spectrometry. Leptin, total & high molecular weight adiponectin, interleukin-6 (IL-6) and high-sensitivity c-reactive protein (hs-CRP), fasting glucose and insulin were measured. Pearson and/or Spearman correlation was used to measure association of free 25(OH)D with the above biomarkers of CVD.

**Results:** Free 25(OH)D was negatively correlated with leptin ( $r = -0.510$ ,  $p = 0.022$ ) and showed an association of greater extent than that between total 25(OH)D and leptin ( $r = -0.275$ ,  $p = 0.034$ ). Although free-25(OH)D and IL-6 showed near significant association ( $r = -0.395$ ,  $p = 0.085$ ), there were no such associations with other biomarkers of CVD considered in this study.

**Conclusions:** The stronger negative correlation between free 25(OH)D and leptin than that of total 25(OH)D and leptin

suggests the potential important role of free 25(OH)D as a marker of vitamin D status in obese children. The lack of correlation between free 25(OH)D and other adipokines is similar to previous studies reported for total 25(OH)D in children. Larger population-based studies on free 25(OH)D are required to determine the clinical significance of these findings in obese children.

#### T-P-3072

##### Role of Vitamin D in Insulin Resistance and Vascular Health in Children?

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**Background:** Total 25-hydroxyvitamin D (25D) levels have been linked to metabolic health, and deficiency has been associated with insulin resistance, and cardiovascular disease risk. These relationships are inconsistent and could be affected by differences in vitamin D binding protein (DBP) and free vitamin D (free D) levels. We therefore evaluated the relationship of total and free D levels to metabolic risk markers in normal weight (NW) and overweight (OW) youth across the spectrum of glucose regulation.

**Methods:** 75 adolescents age  $15.5 \pm 0.2$  [17 NW, 23 OW, 19 OW with prediabetes (OW-PreD), and 16 with type 2 diabetes (T2DM)] had: measurement of insulin sensitivity (IS) by a hyperinsulinemic-euglycemic clamp, endothelial function by reactive hyperemia index (RHI), and body composition (DXA). 25D and DBP were measured and free D calculated. Results are Mean  $\pm$  SE.

**Results:** Across tertiles of free D levels ( $43.5 \pm 4.9$ ,  $19.3 \pm 0.9$ , and  $9.6 \pm 0.4$  pmol/L,  $p < 0.001$ ), the group in the highest tertile had significantly lower percent body fat (%BF) ( $27.8 \pm 2.5$ ,  $34.5 \pm 1.6$ , and  $37.2 \pm 1.3\%$ ,  $p = 0.002$ ), higher IS ( $5.7 \pm 0.9$ ,  $4.6 \pm 0.9$ , and  $1.6 \pm 0.4$  mg/kg/min per  $\mu\text{U/mL}$ ,  $p = 0.056$ ), higher RHI ( $1.73 \pm 0.09$ ,  $1.49 \pm 0.07$ , and  $1.47 \pm 0.06$ ,  $p = 0.03$ ) and lower hs-CRP ( $1.6 \pm 0.5$ ,  $2.6 \pm 0.7$ , and  $3.2 \pm 0.6$  mg/L,  $p = 0.07$ ) compared with the 2nd and 3rd tertiles, respectively. There were no significant differences among the tertile groups with respect to HbA1C, lipid profile or blood pressure. Free D levels were inversely related to %BF ( $r = -0.36$ ,  $p = 0.001$ ), hs-CRP ( $r = 0.26$ ,  $p = 0.025$ ) and positively related to RHI ( $r = 0.25$ ,  $p = 0.03$ ), and IS ( $r = 0.24$ ,  $p = 0.049$ ). After adjusting for race and %BF, total and free D were no longer significantly related to RHI or insulin sensitivity.

**Conclusions:** Youth in the lowest tertiles of Vit D levels have lower insulin sensitivity and worse cardiovascular disease risk profile. However, the relationships of total 25D and free D levels to insulin sensitivity and endothelial function are not independent of the effect of adiposity.

#### T-P-3073

##### Slowing Down and Taking a Second Look: Inhibitory Deficits Associated with Binge Eating are not Food-Specific

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**Background:** Overweight and obese individuals with binge eating (BE) pathology have poor psychological and health outcomes. A more complete understanding of BE maintenance

factors is necessary to inform treatment development, especially considering poor outcome in weight loss interventions. Poor inhibitory control has been posited as a potential BE maintenance factor independent of weight; however, results are mixed, and it is unknown whether such deficits are general or domain-specific (e.g., specific to food stimuli). It is also unknown whether relative elevations in depression in BE groups explain inhibitory control deficits. In the current study, we hypothesized that individuals with BE would display inhibitory control deficits compared to controls, with the most pronounced deficit occurring when food stimuli were used.

**Methods:** Overweight or obese participants with (n=25) and without (n= 65) BE completed a computerized Stop Signal Task (SST) with distinct task blocks featuring food-specific stimuli, positive non-food stimuli, and neutral stimuli.

**Results:** The BE group exhibited poorer inhibitory control across SST stimuli types ( $p = .003$ ,  $\eta^2p = .10$ ) compared to controls, but no group by SST condition interaction was detected ( $p = .38$ ,  $\eta^2p < .01$ ). Including depressive symptoms as a covariate did not significantly alter results.

**Conclusions:** Consistent with previous findings, results suggest that individuals with BE display general inhibitory control deficits compared to weight-matched controls; however, no difference in inhibitory control was detected across the different types of stimuli used. Furthermore, inhibitory control deficits appear to be specific to BE rather than reflective of increased depressive symptoms. Replication and further research is needed to guide treatment targets.

#### T-P-3074

##### The Association between Nonalcoholic Fatty Liver Disease and Metabolic syndrome in Obese Adolescents

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**Background:** Concurrent with the rise of the incidence in obesity, nonalcoholic fatty liver disease (NAFLD) and metabolic syndrome (MS) are increasingly prevalent in obese adolescents. However, the relationship between NAFLD and MS in obese adolescents is not fully validated. The aim of this study was to evaluate the association of metabolic risk profiles and NAFLD among obese adolescents.

**Methods:** This study was a cross-sectional study of the risk factors for NAFLD and MS in obese adolescents. A total of 593 obese subjects aged 10-18 years were recruited in Taiwan. We diagnosed NAFLD by liver ultrasonography. International Diabetes Federation (IDF) consensus was used to define MS. We measured anthropometric, serum biochemical variables, and biomarkers for insulin resistance.

**Results:** 154 (26%) had NAFLD and 83 (14%) had MS. Obese adolescents with NAFLD had significantly higher serum triglyceride concentrations and elevated blood pressures than obese adolescents without NAFLD. After adjusting for age, body mass index, and insulin resistance measured by HOMA-IR, obese adolescents with NAFLD had a higher risk for MS (odds ratio, 2.19; 95% confidence interval, 1.26 to 3.81,  $P = 0.006$ ), as compared with subjects without NAFLD.

**Conclusions:** NAFLD is associated with an increased risk for MS independent of the effects of age, BMI, and insulin resistance in our population of obese adolescents. Further studies are needed to understand mechanisms that underlie this epidemiologic association.

#### T-P-3075

##### The Association of Skin to Right Ventricle Distance on Echocardiogram with Metabolic Syndrome

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**Background:** The constellation of abdominal obesity, elevated triglycerides, reduced high-density lipoprotein cholesterol, glucose intolerance, and hypertension has been represented as the metabolic syndrome (MetS). We previously reported that echo measurement of skin to RV distance (SkRV) is independently associated with anthropometric measures (AMs), age, race, gender and select inflammatory biomarkers. Abdominal obesity and visceral fat are associated with MetS; however, the relationship of SkRV to MetS has not been previously described, which was our objective.

**Methods:** We determined clinical risk factors and AMs in 150 patients who presented to our CDU with chest pain and no history of coronary artery disease. MetS was deemed to be present if patient had at least 3 of the 5 criteria. SkRV was measured from the end systolic parasternal long axis image as the maximal linear distance from the skin to RV, perpendicular to the axis of the aorta. Univariate analysis was done using Pearson's correlation, Student's t-test and analysis of variance (ANOVA). Multiple regression analysis was used to predict SkRV from risk factors significant on univariate analysis.

**Results:** The study group had a mean age of  $46.5 \pm 10.6$  years; mean body mass index of  $32.5 \pm 8.3$ ; 68% were Black, 57% female and 33% were found to have MetS. Mean SKRV distance was significantly higher in patients with MetS than those without ( $32.2 \pm 6.9$  vs  $27.6 \pm 6.56$ ,  $p < 0.0001$ ). On univariate analysis, MetS was associated with body mass index (BMI), SkRV and exercise duration in minutes. On multiple logistic regression, only BMI (OR=1.06,  $p=0.024$ , 95% CI 1.008,1.118) and exercise duration (OR=0.84,  $p=0.025$ , 95% CI: 0.72,0.98) remained predictors of MetS.

**Conclusions:** Skin to right ventricle distance is increased in patients with MetS, however only BMI and exercise duration in minutes are strong predictors of MetS on multiple regression analysis. Since BMI and SkRV are themselves correlated, it suggests that BMI is the stronger predictor of MetS.

#### T-P-3076

##### The Effect of Niacin on Free Fatty Acids and Growth Hormone Secretion in Obese Children

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**Background:** Obese children and adults display lower spontaneous and stimulated growth hormone (GH) secretion, but the mechanisms by which obesity reduces GH are unclear. Circulating Free Fatty Acids (FFA) are one factor believed to inhibit GH secretion in obesity, presumably due to direct effects on hypothalamic GH-regulating neurons. In adults, inhibition of lipolysis by acipimox and niacin lowers circulating FFA concentrations and increases spontaneous and stimulated GH secretion. There are no data in obese children demonstrating the effects of inhibition of lipolysis on GH secretion. We performed a dose-finding study examining the effects of niacin administration on FFA and GH concentrations in obese children. We hypothesized that niacin would lead to a

fall in FFA concentrations and consequently a rise in spontaneous GH concentrations.

**Methods:** Obese (BMI  $\geq$  95th percentile) nondiabetic children age 6-12y were admitted overnight for niacin treatment with 250mg q2h x 3 doses (n=2), 500mg q2h x 3 doses (n=5) or 500mg q1h x 4 doses (n=5). Serum FFA, GH, insulin, and glucose, and plasma growth hormone-releasing hormone (GHRH) and somatostatin (SST) were measured.

**Results:** 8 boys and 4 girls (age  $9.7 \pm 1.8$ y; BMI  $26.4 \pm 3.1$ ; BMIz  $2.2 \pm .25$ ) were studied. FFA were progressively inhibited as the dose and frequency of niacin increased (ANOVA-RM dose x time p =.01) such that niacin 500mg q1h x 4 doses suppressed FFA  $< 0.2$  uEq/L. The patients in the 500mg q1h group also had a significant increase in GH (ANOVA-RM dose x time p =.04). Neither GHRH nor SST changed significantly post niacin. Adverse effects were flushing/warmth (100%), tingling (60%), and abdominal discomfort, nausea, or emesis (20-40%) that diminished in intensity with each subsequent dose.

**Conclusions:** Administration of niacin 500mg q1h significantly lowered serum FFA in obese children and increased GH. These data demonstrate that increased FFA are important suppressors of GH concentration in obese youth.

#### T-P-3077

##### The Impact of Diet-Induced Weight Loss on Tissue Biomarkers for Colorectal Cancer: Preliminary Results from the INTERCEPT Study.

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**Background:** Obesity is associated with raised cancer risk, but there is limited evidence on whether intentional weight loss reduces risk. Bariatric surgery is usually associated with reduced risk, but some studies have demonstrated an increased risk of colorectal cancer (CRC). There are no comparable data for dietary/behavioural programmes, partly because the notorious difficulty of weight-loss maintenance makes it difficult to examine effects on cancer outcomes long term. Cancer-related biomarkers potentially provide a valuable intermediate end-point; improvements in circulating levels of cancer-related serum biomarkers following weight loss suggest risk can be reduced, but few studies have looked at changes at the tissue level.

**Methods:** We have previously demonstrated improvements in serum insulin and C-reactive protein in a small sample (n=20) of obese, but otherwise healthy participants following an 8-week liquid weight loss diet programme (810 kcal/day). This single-arm study included endoscopic examinations pre- and post-weight loss to take colon biopsies. Markers of apoptosis and colonocyte proliferation were assessed using immunohistochemical staining.

**Results:** Participants achieved substantial weight loss (11-18%, median=13.3%). Tissue analysis suggested some change in markers of apoptosis following weight loss (pre-intervention median=1, range=1-3; post-intervention median=1, range=0-2), but differences were non-significant. Ki-67 (a proliferation marker) was significantly reduced over the intervention period (p=0.029).

**Conclusions:** Even in this small sample, weight loss was associated with a significant reduction in Ki67, making this one of the first studies to demonstrate changes at the tissue level following weight loss achieved through diet. Additional

analysis of tissue biopsies is underway, including DNA methylation, which will provide further insight into the effect of weight loss on molecular markers in target tissues for CRC.

#### T-P-3078

##### Truncating homozygous mutation of carboxypeptidase E (CPE) gene in a morbidly obese female with type 2 diabetes mellitus, intellectual disability and hypogonadotrophic hypogonadism

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**Background:** Whole exome sequencing (WES) has revealed a number of new loci causing monogenic obesity. We have investigated a consanguineous Sudanese family with a Mendelian pattern of extreme obesity in an attempt to identify the cause of their disease. The proband was a 20 year old female with childhood-onset morbid obesity (current body mass index (BMI) 51.5 kg/m<sup>2</sup>), intellectual disability, type 2 diabetes mellitus (T2DM) and hypogonadotrophic hypogonadism.

**Methods:** WES was carried out on the proband, and also her mother and sister, who each had less severe obesity (BMI of 36.0 and 31.9 kg/m<sup>2</sup> respectively), and no other symptoms. Sanger sequencing was used to confirm findings and undertake segregation analysis and quantitative RT-PCR was performed on RNA isolated from whole blood samples.

**Results:** Analysis of WES data revealed a homozygous deletion (c.76\_98del) in exon 1 of the CPE gene in the proband, which results in a p.E26RfsX68 truncation of the protein. Sanger sequencing confirmed homozygosity in the proband and heterozygosity in her mother, sister and two non-obese brothers. Another unaffected sister did not carry the deletion. No DNA was available from the father, nor from a diseased older brother with a similar phenotype as the proband. No CPE expression was detected in blood derived RNA from the proband, and expression in the heterozygous sister was lower than the range seen in six controls matched for obesity, age and T2DM.

**Conclusions:** As far as we are aware, this is the first homozygous null CPE mutation described in humans. Carboxypeptidase E is, among others, involved in processing peptides active in the leptin-melanocortin appetite pathway and glucose metabolism. The morbid obesity, intellectual disability, diabetes and the hypogonadism seen in this proband and her brother, recapitulates the phenotypes of the previously described fat/fat and Cpe knockout mouse models. Our data add to the growing number of monogenic obesity loci known in man. (APG and SIA are joint first authors)

#### T-P-3079

##### A New Prospective National Registry for Treatment-seeking Youth with Obesity: Descriptive Analyses of Participating Multicomponent Pediatric Weight Management Programs

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Borzutzky *Los Angeles CA*, Katie Boyle *Hartford CT*, Christison Amy *Peoria IL*, Suzanne Cuda *San Antonio Texas*, Jeanne Dalen *Albuquerque New Mexico*, Alejandro de la Torre *Fort Worth Texas*, Michael Dedekian *Portland ME*, Angels Fals *Orlando FL*, Samreen Fathima *Bangor Maine*, Cassandra Fink *LOS ANGELES California*, Claudia Fox *Minneapolis MN*, Mindy Gaddis *boise Idaho*, H. Mollie Grow *Seattle WA*, Whitney Herring *Jackson MS*, Logan Jenkins *Austin TX*, Lori Johanns *San Antonio Texas*, Starr Johnston *Orono Maine*, Madeline Joseph *Jacksonville FL*, Aaron Kelly *Minneapolis Minnesota*, Eileen King *Cincinnati OH*, Seema Kumar *Rochester MN*, Sylvia Negrete *Albuquerque NM*, Jon Oden *Little Rock AR*, Valerie O'Hara *Orono Maine*, William Stratbucker *Grand Rapids MI*, Brooke Sweeney *Kansas City MO*, June Tester *Oakland CA*, Christine Trapp *Hartford Connecticut*, Jared Tucker *Grand Rapids Michigan*, stephanie Walsh *Atlanta GA*, Wendy Ward *Little Rock AR*, Ashley Weedn *Oklahoma City Oklahoma*, Ronald Williams *Hershey PA*, Chrystal Wittcopp *Springfield MA*, Susan Woolford *Ann Arbor MI*

**Background:** The American Academy of Pediatrics recommends a Stage 3 multi-component pediatric weight management program (PWMP) for youth with persistent obesity. The US Preventive Services Task Force found PWMPs were effective when  $\geq 26$  contact hours were provided over  $\geq 6$  months. Little is known about PWMP design and contact hours related to patient outcomes. The prospective Pediatric Obesity Weight Evaluation Registry (POWER), 29 multi-component PWMPs representing 28 sites in 20 states, is collecting program and patient data to understand the spectrum of PWMP design and its association with health outcomes. The objective of this study is to describe differences in program format among POWER sites.

**Methods:** POWER developed a program profile survey that covered 12 content themes, including provider specialty, program format and duration, dietary approach, and physical activity (PA) sessions. POWER site leads received the survey using a web-based system (REDCap™) over a 6-month period (9/2014-2/2015) during POWER's enrollment phase.

**Results:** Of the 28 POWER sites, 100% completed the survey, representing 29 PWMPs. Seventeen (59%) PWMPs offer a group component plus individual services. All PWMPs include a physician, while other provider types varied: registered dietitian (93%), exercise physiologist or physical therapist (79%), psychologist (66%) and social worker (55%). All PWMPs offer  $\geq 6$  months of treatment. Sixteen (55%) PWMPs offer  $\leq 25$  contact hours over a 6-month intervention. Across the PWMPs, 11 dietary approaches were identified as options when starting treatment, with nutrient-balanced, portion-controlled diet (83%) as most common. Of the 18 (62%) PWMPs that offer PA sessions, 8 (44%) partner with a community setting, 6 (33%) have an on-site component, and 4 (22%) have both.

**Conclusions:** The POWER survey found a broad spectrum of program characteristics, which need to be considered when interpreting health outcomes among youth participating in PWMPs and formulating best-practice guidelines.

#### T-P-3080

##### An Objective, Experimental Approach to Understanding Influences on Infant Intake During Bottle-Feeding Interactions

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**Background:** Bottle-fed infants are at higher risk for overfeeding than breast-fed infants. However, few studies have described sources of individual differences in infants' feeding and satiation behaviors to understand which mothers and infants are at highest risk. The purpose of this study was to use an objective, experimental approach to determine how mother-versus infant-led feeding conditions affect infants' feeding and display of satiation behaviors during bottle-feeding, and to identify maternal and infant characteristics associated with overfeeding.

**Methods:** In a 2-day, within-subjects study of 21 mother-infant dyads, days differed by feeding condition: Mother-Led (ML; mothers were instructed to feed their infants as they normally would at home) and Infant-Led (IL; infants determined the pace and duration of feeding). Intake was determined by bottle weight; percent difference for ML versus IL was calculated. Video records were analyzed to determine duration of feeding and frequency, timing, and type of satiation behaviors infants displayed. Mothers completed standardized questionnaires of feeding styles, eating behaviors, and infant temperament.

**Results:** Infants consumed  $41.8 \pm 17.8\%$  more during the ML than the IL feeding ( $p=.03$ ), but displayed similar numbers of satiation behaviors ( $p=.75$ ). Notable variation existed in the discrepancy between intakes during the ML and IL feedings, with percent difference scores ranging from  $-52.8$  to  $268.9\%$ . 67% of infants consumed more during the ML compared to the IL feeding. Stepwise regression illustrated greater intake during the ML compared to the IL feeding was predicted by mothers' reports of lower levels of infant distractibility, infants' display of fewer satiation behaviors during the ML compared to the IL feeding, shorter time since last feeding, and higher maternal BMI.

**Conclusions:** This objective, experimental approach illustrated that some, but not all, bottle-feeding mothers and infants are at risk for overfeeding during typical feeding interactions.

#### T-P-3081-DT

##### Baseline Demographic and Behavioral Predictors of Weight-Loss in Severely Obese Youth

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**Background:** In order to facilitate the design of more effective and targeted weight management interventions for severely obese youth, we identified which demographic and modifiable behaviors at baseline are most likely to result in weight loss at 3 and 6 months.

**Methods:** In a 12 month randomized controlled trial weight-loss intervention in 91 obese youth aged 10-14 years with body mass index (BMI) above the 97th percentile for age and gender, the following independent baseline variables were included: race, maternal BMI, family income and education; self-reported sweetened sugar beverage (SSB) intake, vegetable and fruit consumption, TV and computer time, health related quality of life, mental health, and measured and reported activity. All analyses were adjusted for baseline weight, height, age, sex, and treatment group (nutrition counseling vs. behavioral group intervention). The relationship between each of these baseline variables and changes in weight, BMI, and BMI z-score (zBMI) were assessed by fitting linear regression and ANOVA models expressed as beta coefficient and p values.

**Results:** Race was a significant predictor for weight change

and zBMI score at 3 (0.013,  $p=.22$ ) and 6 months (.016,  $p=.008$ ). Non-Hispanic white participants lost significantly more weight and had greater reductions in zBMI score than non-Hispanic black participants at 3 months (7.76 vs. 6.91 kg,  $p=.003$ ), (.072 vs. .027,  $p=.006$ ) and 6 months (7.68 vs. 6.81 kg,  $p=.005$ ), (.126 vs. .043,  $p=.003$ ). Each serving per day of a SSB at baseline predicted in a decrease in zBMI score at 6 months (-0.01,  $p=.01$ ). Each serving per day of fruit at baseline was predictive of weight loss at 3 (-0.39,  $p=.005$ ) and 6 months (-0.53,  $p=.019$ ).

**Conclusions:** Race, SSB and fruit consumption at baseline predict weight loss at 3 and 6 months in severely obese youth. Weight loss interventions should be tailored culturally and individually to include specific baseline behavioral targets.

#### T-P-3082

##### Does free-living physical activity influence individual metabolic responses to a sedentary breaks intervention in children?

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**Background:** Clinical studies in adults have shown that interrupting sedentary behavior with physical activity improves metabolic parameters. However, the influence of basal free-living physical activity (FLPA) on these responses is unknown. We tested whether FLPA was predictive of the metabolic response to a sedentary break intervention in children.

**Methods:** We measured FLPA in normal weight ( $N=28$ ; 54% male; 61% White) 7-11 year old children with an accelerometer (Actigraph GT3X+) worn on the non-dominant wrist for one week before each of two experimental visits. One visit involved 3 hours of continuous sitting, and the other 3 minutes (min) of moderate intensity walking breaks every 30 min for 3 hours. Insulin, C-peptide, and glucose were measured every 30 min for 3 hours following an oral glucose tolerance test, and area-under-the-curve (AUC) was calculated for each. Vector magnitude (VM) activity counts were averaged over wear-time minutes during FLPA. Results presented as mean  $\pm$  SD.

**Results:** There was an average of  $11.1 \pm 2.6$  (range: 5-14) valid days and  $2514 \pm 491$  VM counts/wear-time min of FLPA data collected. For both the continuous and interrupted sitting, greater average FLPA counts/min predicted lower insulin AUC ( $r=-0.61$ ,  $r=-0.59$ ; respectively) and C-peptide AUC ( $r=-0.49$ ,  $r=-0.53$ ; respectively) (all  $p<0.05$ ). Results remained significant after controlling for BMI, Tanner stage, age, sex, fat mass, and fat-free mass in a backward stepwise regression. However, FLPA did not predict glucose AUC or the changes in insulin, glucose, or C-peptide AUC between the continuous and interrupted sitting conditions.

**Conclusions:** These findings suggest that FLPA measured at the wrist may be an indicator of cardiometabolic health in children. Future studies are required with a broader adiposity range to better determine the influence of FLPA on individual variations in the metabolic response to interrupted sitting in children.

#### T-P-3083

##### Effect of Dietary Protein at Breakfast on Satiety and Thermic Effect of Food in Normal Weight and Overweight/Obese Children

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**Background:** We previously reported that a protein breakfast meal containing 45 g of protein decreased subjective average appetite and food intake in children, however, the effect on the thermic effect of food (TEF) is unknown. The objective was to determine the effect of dietary protein at breakfast on TEF in normal weight (NW) and overweight/obese (OW/OB) 9-14 year old children.

**Methods:** On 2 separate mornings and in random order, following the measurement of resting metabolic rate (RMR), NW ( $n=6$ ; age=  $11.8 \pm 0.7$  y; BMI percentile=  $46 \pm 13$ ) and OW/OB ( $n=4$ ; age=  $12.7 \pm 0.5$  y; BMI percentile=  $92 \pm 2$ ) children consumed isocaloric (450 kcal) breakfast meals containing 45 g of protein or a control meal containing 7 g of protein. Subjective average appetite and TEF were measured at regular intervals for 5 h.

**Results:** RMR adjusted for body weight was significantly lower in OW/OB children (OW/OB =  $0.017 \pm 0.001$  vs. NW=  $0.022 \pm 0.001$  kcal·kg<sup>-1</sup>·min<sup>-1</sup>,  $P = 0.01$ ). TEF (mean kcal  $\pm$  SEM) after the 45 g protein and control meals were  $51 \pm 5$  and  $22 \pm 5$ , respectively ( $P < 0.0001$ ). TEF adjusted for body weight was affected by treatment ( $P < 0.0001$ ), and there was a treatment by body weight interaction ( $P < 0.05$ ). Subjective average appetite was decreased after the 45 g protein meal compared with the control ( $P < 0.05$ ).

**Conclusions:** These findings suggest that in addition to decreased food intake and subjective appetite, increasing the protein content of a breakfast meal increases TEF, but the effect is diminished in OW/OB children.

#### T-P-3084

##### Effects of Increasing the Egg Protein Content at Breakfast on Subjective Appetite, Food Intake and Glycemic Response in Children.

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**Background:** Consuming 25-30 g of dietary protein at meal time is associated with increased satiety and reduced food intake (FI) in adults. Less is known, however, about the role and optimal dose of dietary protein on satiety, glycemic response, and FI suppression in children. The objective of this study was to determine the effects of increasing the protein content of breakfast meals on satiety, glycemic response, and FI in 9-14 year old boys and girls.

**Methods:** On four separate mornings and in random order, children ( $n=17$ ; age  $12.0 \pm 0.4$  y; BMI percentile  $68 \pm 5.9$ ) consumed isocaloric (450 kcal) breakfast meals containing 15, 30, or 45 g of protein or a control with 7 g of protein. FI from an ad libitum pizza meal was measured 4 h after breakfast. Blood glucose and subjective appetite were measured at baseline and at regular intervals throughout the study measurement period.

**Results:** The 45 g protein breakfast suppressed FI ( $P < 0.05$ ) by 226 kcal and 204 kcal after the control and 15 g protein

breakfasts, respectively. Subjective average appetite was decreased after the 15, 30 and 45g breakfast meals compared with the control ( $P < 0.0001$ ) and remained below baseline for the duration of the study period. Blood glucose was affected by time ( $P < 0.0001$ ), but not treatment ( $P = 0.11$ ), and there was a treatment by time interaction ( $P < 0.0001$ ). Subjective average appetite immediately before lunch was positively associated with FI ( $r = 0.49$ ,  $P < 0.05$ ).

**Conclusions:** In conclusion, only the 45 g protein breakfast meal suppressed FI 4 h later, suggesting a potential role for increased protein intake at breakfast in the promotion of healthier body weights in children.

#### T-P-3085

##### **Fit in Fifth: a school-based physical activity intervention using Fitbits with middle school students**

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**Background:** Less than half of children in the US meet the recommended 60 minutes of daily moderate to vigorous physical activity (MVPA). Thus, the Institute of Medicine called for teachers, parents and school administrators to foster environments that promote MVPA both in and out of school. This study tested the feasibility and acceptability of an open-pilot school-based physical activity intervention using Fitbit devices with middle school students.

**Methods:** Fifth grade students (ages 9-11 years) enrolled in a low-income public school (63% qualify for free / reduced-price meals; 48% non-Hispanic white) in Rhode Island took part in the four-week Fit in Fifth study. Students were given waist-worn Fitbit Zip devices and received a brief classroom based intervention that involved self-monitoring, weekly step goals, and group-based incentives. Post-intervention feedback was elicited from teachers.

**Results:** On average, students ( $n=32$ ) wore their Fitbit Zip device 81% of intervention days. Students averaged 8,688 steps/day and took more steps on weekdays versus weekends (9,366 vs. 7,510;  $p < 0.05$ ). Mean steps decreased over the course of the intervention (9,528 in week 1 to 8,574 in week 4). Post-intervention, teachers reported Fitbit devices fell off student waistbands and the device novelty wore off from week 1.

**Conclusions:** Overall, students found wearing a Fitbit device as acceptable given 81% adherence. Whereas student activity did not increase with the intervention, teachers reported students not using the devices to self-monitor activity as much as at the start of the open pilot. A controlled study is needed to determine whether using self-monitoring devices successfully increases activity in school-age children.

#### T-P-3086

##### **Gender Influence on Nutrition Intake Among Youth with Obesity in a Community-based Lifestyle Intervention**

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**Background:** Details on youth nutrition changes after lifestyle interventions are lacking. Actively Changing Together (ACT),

an obesity intervention, was evaluated among 8-14 year olds with obesity and a parent/guardian in an underserved agricultural community. The goal of this analysis was to examine nutrition changes in these youth.

**Methods:** The intervention, delivered in small-group settings and offered in English or Spanish formats, consisted of 90-min. weekly sessions x 12 weeks. Each session included group physical fitness and cooking sessions for youth and parents, and a problem-solving session for parents. Anthropometrics (weight, height, waist circumference & percent body fat) and nutrition intake were measured (via Block Food Screener) at baseline and post-intervention. T-tests comparing change scores on nutrition intake by gender were also conducted.

**Results:** Dietary analyses were conducted on 68 youth (37 boys, 31 girls; mean age  $10.9 \pm 1.7$  yrs). Both boys and girls grew taller and gained weight, but there was a strong gender-influence on nutrition sub-categories. Girls significantly reduced calorie intake (mean  $-476 \pm 726$  kcal) more than boys (mean  $111 \pm 758$  kcal,  $p = .001$ ). Compared to boys, girls had larger reductions in intake of meat, fish and poultry ( $p = .02$ ); dairy ( $p = .04$ ); protein ( $p = .002$ ); saturated fat ( $p = .003$ ); and fiber ( $p = .02$ ). Girls also reduced calories from sugary beverages (mean  $-26 \pm 50$  kcals) more than boys (mean  $1 \pm 44$  kcals,  $p = .02$ ). There were no differences in consumption of fruits or vegetables.

**Conclusions:** This study sheds light on important gender-specific nutrition changes after an obesity intervention. While decreasing energy intake is important for weight management, more work is needed to determine if this is occurring to the detriment of overall nutrition quality, particularly in girls. Further work will assess the relationships of nutrition intake with physical activity, family and psychosocial influences, and durability of changes observed in these post-intervention results.

#### T-P-3087

##### **Impact Assessment of a Sports Kit on Physical Activity in Children Aged 8 to 11 with an Innovative Methodology Using 3D Accelerometers**

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**Background:** Only 50% of French children follow the WHO recommendation for physical activity. This study proposes utilizing a tool that demonstrates sports in a safe and fun way. The sports kit: "Le Sport Ça Me Dit", uses an innovative methodology with 3D accelerometers to promote physical activity. The objective of the study is to confirm that the use of the sports kit increases, at medium-term, the children's motivation and global physical activity (PA).

**Methods:** In the EPODE France community-based programme, 5 facilitators provided bi-weekly physical activity (PA) sessions to children for 7 weeks, using the kit, including 6 different activities. 213 children aged 8 to 11 were recruited, from which 122 composed the control group and 91 the action group. Each child received a 3D accelerometer wristband. The children's PA was recorded once a week for 14 weeks (7 weeks with the sports kit) using accelerometers. In parallel, the children completed a questionnaire, before, during and at the end of the study on their PA, screen time and sleeping habits.

**Results:** The data were treated to examine the difference between the action and control group as well as the evolution of both groups over the study. The data analysis illustrates an increase in physical activity, an increase in children's motivation to practice sports, a decrease in screen time and an increase in sleep duration.

**Conclusions:** This study illustrates the ability of a fun tool to increase motivation and physical activity in children. It also assesses the potential sustainable impact at medium-term.

#### T-P-3088-DT

##### **Implementation of a Mentor-Led Recreation Center Intervention within a Multilevel Multicomponent Obesity Prevention Intervention in Baltimore City**

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**Background:** B'More Healthy Communities for Kids (BHCK) is a multilevel, multicomponent obesity prevention intervention that utilizes trained youth leaders (college students ages 18-22) to deliver a nutrition curriculum to children ages 10-14 in recreation centers and the community. At baseline, 19% of children were overweight and 24% were obese. The curriculum included 14 interactive, experience-centered lessons on physical activity, healthier drinks, snacks, breakfast and cooking. This analysis focuses on process evaluation of 7 recreation centers in Wave 1.

**Methods:** BHCK Wave 1 included 14 recreation centers in low-income neighborhoods (7 randomized to intervention). We developed 9 process evaluation standards to evaluate reach, dose delivered and fidelity. Data were collected on a recreation center interventionist form by research staff during each session.

**Results:** Reach to our target group was 10.39 (SD 4.94) youth per session (moderate). Dose delivered to rec centers averaged 10 visits per rec center (high). 12.32 (SD 2.81) food samples and 14.31 (SD 1.97) handouts distributed per session (moderate dose delivered). 12 of our original 16 youth leaders completed the entire intervention (high fidelity). Process data were discussed once per phase with the team to modify the intervention.

**Conclusions:** Our mentoring program to prevent obesity in this at risk population was successfully implemented in 7 recreation centers. Challenges existed with reaching 10-14 years olds and sustainability of the program. In Wave 2, we will modify recruitment strategies and utilize a train the trainer module for teen councils in recreation centers to sustain the nutrition curriculum.

#### T-P-3089

##### **Individualized Physical Therapy Within a Multi-disciplinary Pediatric Weight Management Clinic Improves Gross Motor Function in Youth with Obesity**

Nicole Hybben *Minneapolis Minnesota*, Justin Ryder *Minneapolis Minnesota*, Susan Jacobsen *Minneapolis MN*, Sara Dooley *Maple Grove MN*, Norrie McKnight *Burnsville Minnesota*, Aaron Kelly *Minneapolis Minnesota*, Claudia Fox *Minneapolis MN*

**Background:** Impaired gross motor function is associated with obesity in children and adolescents making it difficult to function at age appropriate level in activities of daily living

and to participate in family and school activities. Therefore, we evaluated whether an individualized physical therapy (PT) treatment program can improve gross motor function, independent of weight loss, as part of a multi-disciplinary pediatric weight management clinic.

**Methods:** Patients receiving PT as part of a multi-disciplinary tertiary care pediatric weight management clinic, who had 6-month follow-up data, were used for this study (n=22; 6-16 years of age; M=10, F=12; mean baseline BMI=34.0±8.1). PT treatment was individualized to address impairments in strength, balance, activity tolerance and coordination. Frequency of visits was tailored to meet each patient's needs ranging from weekly to monthly. Patients were evaluated at baseline and 6 month follow-up for change in BMI and change in percentile rank on The Bruininks Oseretsky Test of Motor Proficiency – 2nd Edition (BOT-2) Strength and Agility Composite. Changes over 6 months were evaluated by paired t-tests. A repeated measures ANOVA was used to determine if changes in BOT-2 scores were observed after adjusting for change in BMI over 6 months.

**Results:** Following 6-months of treatment, patients significantly reduced their BMI (34.0±8.1 to 33.2±7.6 kg/m<sup>2</sup>, p=0.046) and significantly improved their BOT-2 composite scores (6.4±6.6 to 15.6±13.5 percentile rank, p<0.001). When adjusting for change in BMI using a repeated measures ANOVA, improvements in BOT-2 scores remained significantly improved (p=0.002).

**Conclusions:** These data suggest that individualized PT, as part of multi-disciplinary pediatric weight management clinic, can improve gross motor function independent of weight-loss in youth with obesity. These findings will need to be confirmed in randomized-controlled trials.

#### T-P-3090

##### **Measuring Obesity in Saudi School Children Due To Excess Television Viewing**

Sameer Al-Ghamdi *Al-Kharj Riyadh Province*

**Background:** Background: There has been a dramatic augmentation in the incidence rate of childhood obesity throughout the globe, which is attributed to increase in the time spent of watching TV. However, no significant research has been done regarding the relation between obesity and TV viewing in the Arabian Peninsula.

**Methods:** A case-controlled study was conducted in which those children were selected who had a visit at the school health clinic in King Abdulaziz Housing for National Guard (Iskan), Riyadh, Saudi Arabia during the study period (February to April, 2012). 397 participants were selected randomly.

**Results:** The results revealed that greater number of televisions hours at home (Chi-sq. 33, p <0.001) is related with higher BMI, along with weekend TV watching for more than three hours per day, night-time TV watching and if siblings decided how much TV should be watched. While, weekend TV watching for more than three hours per day, night-time TV watching and if siblings decided how much TV should be watched.

**Conclusions:** More TV watching hours is established to be a significant risk factor for increase in school-aged obesity, by the current investigation.

**T-P-3091****Overfeeding Related to Inaccurate Dispensing of Powdered Infant Formula may Contribute to Increased Adiposity in Formula Fed Infants**

Abby Duhé *Baton Rouge LA*, Corby Martin *Baton Rouge LA*, Jeffrey Burton *Baton Rouge LA*, Anne Gilmore *Baton Rouge LA*, Leanne Redman *Baton Rouge Louisiana*

**Background:** There is a long-standing argument as to whether or not breastfeeding is protective against the development of childhood obesity with supporters targeting nutrient composition and self-regulation as potential mechanisms. Since humans are known to inaccurately measure serving sizes, the ability of caregivers to accurately prepare infant formula is also unlikely. The aim was to test the accuracy of individuals to dispense powdered infant formula as compared to the recommended serving sizes.

**Methods:** Fifty- three adults were provided a commercial infant formula container with the package instructions and formula scoop. Each individual was asked to dispense 3 trials of 1, 2, 3, and 4 scoop serving sizes of powdered infant formula into bottles in random order. All bottles were weighed to provide actual weights of the powdered infant formula dispensed, and the actual weights were compared to the recommended serving size weights.

**Results:** Among 636 bottles, 89.9% of the bottles contained more powdered infant formula as compared to the recommended serving sizes. The mean difference in the bottles was 12.1% ( $1.1 \pm 0.2$  g) for 1 scoop bottles, 10.7% ( $1.9 \pm 0.2$  g) for 2 scoop bottles, 10.8% ( $2.8 \pm 0.2$  g) for 3 scoop bottles, and 11.0% ( $3.8 \pm 0.2$  g) for 4 scoop bottles. This increase in powdered infant formula equates to almost an additional day of energy intake per week.

**Conclusions:** It is evident that adults over-dispense infant formula resulting in unintentional overfeeding of infants. This unintentional overfeeding related to inaccurate measurement of powdered infant formula rather than the nutrient composition of commercial infant formula may be a contributor of increased adiposity in formula fed infants.

**T-P-3092****Physical Activity Improves Weight Trajectories for Adolescents Post-Bariatric Surgery**

Megan Stark *Atlanta GA*, Amelia Jazwa *Atlanta GA*, Jean Welsh *Atlanta Georgia*, stephanie Walsh *Atlanta GA*, Sheethal Reddy *Atlanta GA*, Mark Wulkan *Atlanta GA*

**Background:** Adolescents who meet the minimum physical activity (PA) recommendation (180 minutes/week of moderate-to-vigorous PA, American College of Sports Medicine) post-laparoscopic sleeve gastrectomy (LSG) appear to have improved weight loss trajectories and maintenance. In adults, PA has been shown to preserve fat-free mass post-surgery, increasing resting metabolic rate which leads to weight loss maintenance. This study assesses if weight loss trajectories are better for adolescent bariatric patients who meet minimum exercise recommendations.

**Methods:** Retrospective analysis of our clinical database was performed for patients who underwent LSG between January 2011 and December 2014, and completed 6- and 12-month post-operative visits. Percent change in mean BMI and pannicular waist circumference (WC) were used to assess changes in adiposity and its distribution at baseline (pre-op) and at 6-month and 1-year post-op. Low exercisers (LE) (<180

min PA/week) and high exercisers (HE) ( $\geq 180$  minutes PA/week) were analyzed.

**Results:** Nine patients met entry criteria, 4 LE and 5 HE. Overall BMI decreased significantly at 6-months, 48.2 to 39.6 (decrease 17.7%,  $p < 0.01$ ) and 1-year, 48.2 to 37.1 (decrease 22.6%,  $p < 0.01$ ). When analyzed separately, LE BMI decreased more at 6-months, 19.0% vs. 16.7%, though this difference was not statistically significant,  $p = 0.37$ . At 1-year, this was reversed with HE BMI decreasing more (25.4% vs. 19.2%,  $p = 0.10$ ). There was no difference in percent change in WC between groups.

**Conclusions:** This pilot study suggests that patients who met PA recommendations have a more gradual, but greater BMI decrease by one-year post-surgery, possibly due to maintenance of muscle mass. Further studies, with more power, are needed to determine if this trend is true, and maintained over time.

**T-P-3093****Physical Performance Limitations in Children with Obesity**

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**Background:** Children with obesity often find exercise uncomfortable and unrewarding. The purpose of this study was to evaluate physical fitness in children with obesity to identify areas likely to limit function.

**Methods:** From October 2014 – March 2015, patients were assessed in a multidisciplinary pediatric weight management clinic. Physical activity (PA) and television (TV) time were measured via survey. Anthropometrics, body composition (InBody 770), hand and quadriceps strength (handheld dynamometer), flexibility (sit and reach), six minute walk distance (6MWD) and motor proficiency (Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form) were assessed. Strength, flexibility, and 6MWD scores were considered below expected if  $> 1$  sd below published normative values. BOT-2 scores were considered below expected if  $< 18$ th percentile of age and sex based normative values.

**Results:** Analyses included 118 subjects with the following characteristics: age  $11.7 \pm 3.6$  years, 64% female, 64% African American, 19% Caucasian, 10% Hispanic, BMI Z-score  $2.56 \pm 0.41$ , 81% with severe obesity (BMI  $\geq 120\%$  of 95th percentile), and percent body fat  $47 \pm 6\%$ . Most participants (74.1%) did not meet PA guidelines (60 minutes 5 day/wk), and nearly half (49.7%) reported over 4 hr/day of TV watching. 91 (77%) patients had decreased quadriceps strength and 104 (88%) had below expected hand grip strength. Muscle endurance was reduced in 98 (83%) on the curl up test and 100 (85%) on a modified push up. Two thirds had BOT-2 scores  $< 18$ th percentile. Hip and low back flexibility was below expected in just over half (52%). Nearly all (86%) had below expected 6MWD. All patients had a deficient area, and 79% were deficient in at least 3 of 5 areas.

**Conclusions:** Children with obesity have physical performance limitations that could prevent them from being physically active. More research is needed to investigate the impact of targeted exercise prescription to remediate deficits and improve overall physical fitness in children with obesity.

**T-P-3094**

**Predictors of Outcomes At One Year Post-Intervention for a Pediatric Weight Management Program**

Ann Scheimann *Baltimore Maryland*, Elizabeth Getzoff Testa *baltimore md*, Sarah Hornack *Baltimore MD*, Michelle Demeule *Baltimore MD*, Bradley Schwimmer *Baltimore MD*, Vicky Rogers *Baltimore Md*

**Background:** This study aims to identify predictive factors of a decrease in BMI at one year after start of a pediatric weight management program. Others have previously determined that age, baseline weight status and psychological symptoms, and initial activity level were predictors of treatment success indicated by weight loss. In addition to these variables, we also examined the impact of eating behavior and other demographic characteristics (i.e., type of insurance) on improvements in health.

**Methods:** IRB approved retrospective review of data collected from families of children between ages 7-18 enrolled in pediatric weight management between 2005-2014 at an urban hospital. We focused our analyses upon predictors of outcome at 1 year based upon change in BMI z-score. Children were divided into 3 groups based upon change in BMI z-score from baseline to 1 year post intervention (BMI z-score "losers", BMI z-score "maintainers" and BMI z-score "gainers"). Baseline parameters analyzed included demographics, anthropometry including body composition by BIA, self-reported eating behaviors, birth history, self-reported screen type and physical activity during school among others. Statistical methods included ANOVA, and Fisher's exact test were appropriate using INSTAT statistical software package and SPSS.

**Results:** A total of 215 children were eligible for analyses. Mean age of the population was 12.1 +/- 2.5 years; mean BMI z-score was 2.5 +/- 0.3. 41% of the patients were males. 58% of the families had medical assistance; 41% had commercial insurance. Among the population at 1 year post-intervention, girls ( $p=0.0034$ ), younger children ( $p=0.014$ ) and families with commercial insurance ( $p=0.0131$ ) were more likely to lose weight. Screen time at intake ( $p=0.04$ ) but not gym at school or dysfunctional eating behavior were more likely to lose weight.

**Conclusions:** Thus this study adds to the literature base suggesting that the earlier one engages in treatment and with healthier habits, more success is attained.

**T-P-3095**

**Preventing Childhood Obesity in Early Care and Education Settings: Lessons Learned from Two Ongoing Intervention Studies**

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**Background:** Obesity prevention in young children is a public health priority. While a number of interventions have been conducted in early care and education settings, few have targeted the youngest children in care and the less formal types of care. Additionally, only one has provided recommendations to help inform future interventions.

**Methods:** This paper presents lessons learned from two distinct intervention studies in early care and education settings to help guide researchers and public health professionals interested in implementing and evaluating similar interventions. We highlight two ongoing studies: one targeting

children ages four to 24 months in child care centers and the other intervening in children 18 months to four years in family child care homes.

**Results:** To date, our experiences suggest that an intervention should have a firm basis in behavior change theory; an advisory group should help evaluate intervention materials and plan for delivery; and realistic recruitment goals should recognize economic challenges of the business of child care. A flexible data collection approach and realistic sample size calculations are needed due to high rates of child (and sometimes facility) turnover. An intervention that is relatively easy to implement is more likely to appeal to a wide variety of early care and education providers.

**Conclusions:** Interventions to prevent obesity in early care and education have the potential to reach large numbers of children. It is important to consider the unique features and similarities of centers and family child care homes and take advantage of lessons learned from current studies.

**T-P-3096-DT**

**Psychometric Study of an English Version of Perceived Stress Scale in Minority Adolescents**

Chen Li *Los Angeles CA*

**Background:** Prior work in both children and adults suggests a link between chronic stress and obesity-related morbidity, indicating the critical need to validate measures of stress in populations of youth who suffer from significant health disparities with respect to obesity, insulin resistance, and type 2 diabetes risk. The current study was therefore aimed to evaluate psychometric properties and compare effectiveness of three versions of Perceived Stress Scale (PSS-14, PSS-10, and PSS-4) in obese Latino and African American adolescents.

**Methods:** Data were available for 201 subjects. Internal consistency reliability and alternate forms reliability were evaluated by the computation of Cronbach's alpha ( $\alpha$ ) and by correlation and agreement analyses among 14-, 10-, and 4-item Perceived Stress Scale.

**Results:** Cronbach's alpha values for PSS-14, PSS-10, and PSS-4 were 0.59, 0.67, and 0.49, respectively. Correlations across three versions of Perceived Stress Scale were significant (Spearman's rho coefficients calculated on the total and subscale level were: 0.93, 0.82, and 0.56 (total scale); 0.97, 0.84, and 0.84 (coping subscale); and 0.91, 0.84, and 0.90 (stress subscale), data shown as between PSS-14 and PSS-10, PSS-14 and PSS-4, and between PSS-10 and PSS-4 respectively, all correlations were of statistical significance with  $P<0.01$ ). Normalized total and subscale scores of three versions of Perceived Stress Scale correspond with acceptable and good agreement according to Bland-Altman test.

**Conclusions:** The 10-item version of Perceived Stress Scale (PSS-10) exhibits optimum internal reliability as compared to the 4- and 14-version of the instrument in the present study. Use of the shorter version of PSS would also reduce study burden on minority teens, increasing efficiency of stress assessments in future studies in this difficult study population.

**T-P-3097**

**Quantifying Infant Feeding Behavior: A Sensor Based Approach**

Muhammad Farooq *Tuscaloosa AL*, Paula Chandler-Laney *Birmingham Alabama*, Maria Hernandez-Reif *Tuscaloosa AL*, Edward Sazonov *Tuscaloosa Alabama*

**Background:** Research shows that irrespective of feeding mode (breast-fed or bottle-fed); development of obesity is closely associated with the weight gain during early infancy, especially first six months. Current methodologies to assess infant feeding behavior are largely limited to parental surveys and weighed test meals, highlighting the need for objective, free-living, feeding behavior monitoring system. Feeding behaviors can be characterized by parameters such as sucking counts (sucking rate), meal duration and frequency of intake etc. This work presents the use of a piezoelectric film sensor for monitoring of jaw movements during sucking episodes to quantify infants' sucking behaviors in terms of sucking counts.

**Methods:** Meals for a cohort consisting of 6 breast-fed and bottle-fed infants were videotaped and synchronized with sensor signals. Videos and sensor signals were divided into 10-second epochs, which were annotated by two human raters for sucking counts. Sensor signals were normalized to account for amplitude variation among infants. A peak detection algorithm was used to compute sucking count where peaks were only considered above a certain threshold based on 80th percentile of the signal amplitude.

**Results:** A leave one out cross validation approach gave a mean absolute error of 7.11% between the average sucking counts of human raters and algorithm estimated sucking count. For a two-way mixed model the intra-class correlation coefficient between the two human raters was 0.98 whereas between human and algorithm ICC was 0.92.

**Conclusions:** The results show that the sensor and algorithm can reliably estimate sucking counts.

#### T-P-3098

**Teens Tracking 4 Health (TT4H): A school-based weight intervention utilizing real-time tracking technology**  
Raquel Hernandez *St. Petersburg Florida*

**Background:** Electronic monitoring technology (EMT) is known to be beneficial in weight loss behavior modification strategies; however, current evidence is limited regarding the role of EMT with at-risk adolescents. Schools are known as important settings to engage adolescents in health behavior change, but accurately following weight-specific behaviors pose a continued challenge. The Teens Tracking for Health (TT4H) program sought to test the feasibility of a school-based intervention which targeted tracking of physical activity (PA) and nutritional intake with electronic monitors (Fitbit®) and real-time dashboards (Fitabase) to determine if this technology can improve assessment and communication of PA among at-risk adolescents.

**Methods:** Eighteen 9th graders (7 males, 11 females) with BMI ≥ 85th percentile attending an urban high school voluntarily enrolled in a 12-month, school-based weight management program which included evidence-based nutritional, fitness and behavioral support. Mean age at baseline was 14.2 yrs and mean BMI was 27.6 kg/m<sup>2</sup>. Participants wore Fitbit® Flex monitors and received real-time behavior feedback via text messages and phone. We report initial feasibility related to participation, Fitbit® and Fitabase utility, and change in PA over the first 11 weeks.

**Results:** Fitbit® technology was well received among participants with 72% (n=13) consistently utilizing their device. Fitabase successfully provided real-time measurements of participants' weight-specific behaviors. Participant daily step average increased from 6249 (SE=907.7) steps to 7400 (SE=1243.5). Average weekly minutes of moderate/intense activity also increased from 88 (SE=15.7) to 97 (SE=17.7).

BMI z-scores remained stable in this initial phase (CI: -0.489-0.896; p=.527).

**Conclusions:** Early results support the use of EMT along with a broad school-based weight intervention as a strategy to increase overall activity and weight maintenance among at-risk adolescents. Our program intervention and data collection is ongoing.

#### T-P-3099

**Active Nutritional Intervention for Reducing Obesity and Metabolic Syndrome**

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**Background:** The rising prevalence of obesity and metabolic syndrome is fast becoming a global concern. We review here the potential etiological factors for causation of obesity and provide evidence on the diet and nutrition that can reduce obesity.

**Methods:** A computer assisted literature search was used to find nutritional intervention studies, conducted in the last 10 years.

**Results:** Sedentary life style and Westernized dietary habits are found more common globally among all causation factors of obesity. Substantial marketing of energy-dense foods, fast food outlets, sugar-sweetened soft drinks and fruit juices are also among the major factors. Nutritional interventions such as Mediterranean diet and diet high in omega-3 fats and fiber are significant in reducing obesity and metabolic syndrome risk. Analysis of various dietary patterns effective in reducing obesity and metabolic syndrome in global population showed that subjects following a Mediterranean dietary pattern in a 6-year prospective study showed much lower metabolic syndrome incidence. A meta-analysis showed that low-carbohydrate diets are as beneficial in reducing weight and thus decrease components of metabolic syndrome as compared to low-fat diets. Further high-fiber foods as well as nuts are associated with decreased metabolic syndrome risk factors.

**Conclusions:** Among different dietary patterns that reduce metabolic syndrome, Mediterranean diet is the most important one as it consists of a healthy, non-calorie restricted, balanced diet that combines individual elements such as high fiber, omega -3 fats and nuts with a stress-free lifestyle. Further, protective factors against obesity which needs to consider are the promotion of regular physical activity, making healthy eating choices easier, reducing the marketing of energy dense foods and beverages to children and developing community-wide awareness programs.

#### T-P-3100

**Behavioral Interventions with Varying Doses of Physical Activity on Weight Loss: The Heart Health Study**

Renee Rogers *Pittsburgh Pennsylvania*, Erik Schelbert *Pittsburgh PA*, John Jakicic *Pittsburgh PA*

**Background:** Behavioral interventions are effective for short-term weight management, and both reduced energy intake and increased physical activity are key behaviors. This study examined the ability of a behavioral intervention to achieve physical activity levels recommended for public health (150 min/wk) or weight control (250 min/wk). This study also examine whether weight loss and changes in body composition varied by these prescribed levels of physical activity in adults

who were overweight or obese across 6 months.

**Methods:** Sedentary adults (N=275; BMI: 32.3±3.8 kg/m<sup>2</sup>) in a behavioral program were randomized to a reduced calorie diet (DIET, N=90), diet plus a moderate dose of physical activity (MOD-EX, N=92), or diet plus a high dose of physical activity (HIGH-EX, N=93). All groups received weekly intervention sessions and were prescribed a diet to reduce energy intake (1200-1800 kcal/day). MOD-EX was prescribed unsupervised moderate-intensity physical activity that progressed to 150 min/wk, whereas HIGH-EX was progressed to 250 min/wk. Physical activity, weight, BMI, and percent body fat were assessed at 0 and 6 months.

**Results:** Retention at 6 months was 87.6% with no difference between groups. Physical activity at 0 and 6 months was 48.8±61.3 and 78.1±98.4 min/wk in DIET, 47.0±70.3 and 172.5±112.5 min/wk in MOD-EX, and 78.8±96.1 and 245.3±135.7 min/wk in HIGH-EX (Group X Time p-value <0.001). Weight significantly decrease in all groups (DIET: -8.4±6.2 kg, MOD-EX: -9.7±6.1 kg, HIGH-EX: -8.9±6.0 kg; P<0.001), with no significant difference between groups. Similar results were observed for change in BMI and percent body fat.

**Conclusions:** The MOD-EX and HIGH-EX interventions were successful at achieving the prescribed dose of physical activity in adults with obesity. Despite the lack of additional short-term weight loss, there may be additional health benefits that result from these amounts of physical activity that warrant further investigation in adults with obesity. Supported by: NIH (R01 HL103646)

#### T-P-3101

**Can Diet Quality be Crowdsourced to Facilitate Self-Monitoring? Evidence for Using Crowdsourcing and Bite Counting for Tracking Diet Quality and Energy Intake**  
Gabrielle Turner-mcgrivie *Columbia South Carolina*, Sara Wilcox *Columbia SC*, Andrew Kaczynski *Columbia SC*, Donna Spruijt-Metz *Los Angeles California*, Eric Muth *Clemson SC*, Adam Hoover *Clemson SC*

**Background:** Smartphone food photography and wearable sensors could reduce participant burden for diet self-monitoring. The goals of the present study were to 1) assess if untrained individuals can accurately crowdsourcing diet quality ratings of food photos and 2) get feedback on other low-burden diet self-monitoring approaches.

**Methods:** Participants were recruited via Amazon Mechanical Turk, which included a 1-page description on rating foods using the Traffic Light Diet approach. Participants rated 10 photos of foods as red, yellow, or green and provided feedback on ease of use for diet self-monitoring comparing photo-taking, a wearable Bite Counter, or a standard diet app. Participants also rated what diet tracking app features would encourage regular self-monitoring.

**Results:** Adult participants (n=75; BMI 28.0±7.5; age 37±11; 43% college grad; 59% attempting weight loss) completed the survey. Raters demonstrated high red/yellow/green accuracy (>75%) examining all foods. Individual photos were rated accurately at least 50% of the time (range=52-100%). The Bite Counter was rated as easiest to use for self-monitoring followed by the photo-taking approach. Participants selected ability to review and track progress as the most motivating feature for diet app usage (35%), followed by having diet tracking be completely automated (27%) and ability to earn points and rewards (27%).

**Conclusions:** Collectively, participants were able to accurately

rate diet quality. Since feedback from crowdsourcing relies on the consensus of the majority, this method holds promise as a low burden approach to providing diet quality feedback. In addition, wearable sensors for energy intake tracking (e.g., Bite Counter) were rated highly by users.

#### T-P-3102

**Comparison of Two Different Fibre Supplements on Body Composition, Waist, Insulin and Glucose in Overweight and Obese Individuals**

Sebely Pal *Perth Western Australia*, Suleen Ho *Perth Western Australia*, Roland Gahler *Coquitlam BC*, Michael Lyon *Coquitlam BC*, Simon Wood *Vancouver and Perth BC and Western Australia*

**Background:** Higher fibre intakes are associated with risk reduction for chronic diseases. However, many people find difficulty in consuming enough fibre through their diet. Fibre supplements may be an effective alternative. The aim of this study was to investigate the effects of the polysaccharide complex PolyGlycopleX® (PGX®) supplementation on diet, weight-loss and lipids in overweight and obese individuals.

**Methods:** This was a randomised, double-blind 52 week study where participants were placed into one of 3 groups: control group (rice flour); PGX group (PGX) and psyllium group (PSY). Participants followed their usual diet but consumed 5 g of their supplement mixed with 250 ml of water 5-10 min before each meal.

**Results:** Body Fat was significantly lower in PGX compared to control at 6 (-1.8 kg) and 12 months (-1.9 kg) and in PSY compared to control at 6 (-1.9 kg) and 12 months (-1.4 kg). Waist was significantly lower in PGX compared to control at 3 (-1.9 cm), 6 (-2.1 cm) and 12 months (-2.9 cm) and in PSY compared to control at 3 (-2.2 cm), 6 (-2.7 cm) and 12 months (-1.9 cm). Insulin was significantly lower in PGX compared to control at 3 (-0.57 mmol/L) and 6 months (-0.62 mmol/L) and in PSY compared to control at 3 (-0.6 mmol/L), 6 (-0.58 mmol/L) and 12 months (-0.6 mmol/L). Serum glucose was significantly lower in PGX at 3 months (-0.25 mmol/L) compared to control.

**Conclusions:** A simple strategy of PGX supplementation may offer an effective solution to long-term weight-loss and then management without the need for other nutrient modification.

#### T-P-3103

**Comparison of Two Different Fibre Supplements on Diet, Body Weight and Lipids in Overweight and Obese Individuals**

Sebely Pal *Perth Western Australia*, Suleen Ho *Perth Western Australia*, Roland Gahler *Coquitlam BC*, Michael Lyon *Coquitlam BC*, Simon Wood *Vancouver and Perth BC and Western Australia*

**Background:** Higher fibre intakes are associated with risk reduction for chronic diseases. However, many people find difficulty in consuming enough fibre through their diet and so supplementation may be an effective alternative. The aim of this study was to investigate the effects of supplementation with PolyGlycopleX® (PGX®), a complexed polysaccharide, on diet, weight-loss and lipids in overweight and obese individuals.

**Methods:** This was a randomised, double-blind 52 week study where participants were placed into one of 3 groups: control group (rice flour); PGX group (PGX) and psyllium group

(PSY). Participants followed their usual diet but consumed 5 g of their supplement mixed with 250 ml of water 5-10 min before each meal.

**Results:** Energy and macronutrient intake was significantly decreased in PGX and PSY groups compared to the control group. Weight was significantly lower in the PGX group compared to control at 3 (-1.6 kg), 6 (-2.6 kg) and 12 months (-2.6 kg) and in the PSY group compared to control group at 3 (-1.1 kg) and 6 months (-2.4 kg). Total cholesterol was significantly lower in the PGX group compared to control at 3 (-0.41 mmol/L) and at 6 months (-0.28 mmol/L) and in PSY group compared to control at 3 (-0.35 mmol/L) and 6 months (-0.27 mmol/L). HDL cholesterol was significantly increased in PGX compared to control at 12 months (0.15 mmol/L) and LDL cholesterol was significantly lower in PGX at 3 (-0.42 mmol/L) and 6 months (-0.35 mmol/L) compared to control and PSY at 3 months (-0.25 mmol/L) compared to control.

**Conclusions:** A simple strategy of PGX supplementation may offer an effective solution to long-term weight-loss and then management without the need for other nutrient modification.

#### T-P-3104

##### Counting Chews with Sensors

Muhammad Farooq *Tuscaloosa AL*, Edward Sazonov *Tuscaloosa Alabama*

**Background:** Research results suggest that there may be a relationship between the intake rate and total energy intake during a meal. The rate of intake can be characterized by the chewing rate i.e. number of chews per second; which can further be monitored using wearable sensors. A number of solutions using commercially available sensors have been proposed to monitor food intake via monitoring of chewing, but little work has been done in automatic counting of chews. With the recent advances in printing technologies, it is possible to print/draw application specific sensors. This work presents a comparison between the performance of a commercially available piezoelectric film sensor and a plotter drawn strain sensor for chew counting.

**Methods:** A plotter-drawn and off-the shelf piezoelectric strain sensors were attached to the mandible immediately below the outer ear. The sensor signals were collected from 5 individuals while eating a peanut butter sandwich, an apple and five almonds. These food items represent different textures and require chewing effort of different strengths. A low pass filter with cutoff frequency of 3Hz was used to eliminate frequency components above the chewing frequency. A peak detection algorithm was used to estimate the number of chews.

**Results:** The piezoelectric strain sensor and the plotter-drawn strain sensor were able to achieve absolute mean error rates of  $8.09 \pm 7.16\%$  and  $8.26 \pm 7.51\%$  respectively for estimating the number of chew counts in 98 chewing segments.

**Conclusions:** These results show that sensor based approach can potentially be used to accurately quantify the chewing rate. More extensive studies are needed to evaluate the performance of the proposed method in the community.

#### T-P-3105

##### Daily consumption of commercially available high-protein pasta, in comparison to traditional gluten-free pasta, favorably impacted weight loss and retention of lean mass in adults adhering to calorie restricted diets

Carol Johnston *Phoenix Arizona*, Jessica Knurick *Las Vegas NV*

**Background:** In a recent review, carbohydrate restriction was considered the 'best dietary approach to effectively resolve metabolic syndrome'. However, adherence to carbohydrate restriction is difficult as high carbohydrate foods are mainstays in the U.S. diet. This pilot, 12-week crossover study examined the feasibility of utilizing commercially available high protein pasta for weight loss.

**Methods:** Adults at risk for metabolic syndrome (n=39, TG/HDL ratio >1.5 for women and 2.2 for men) were randomly assigned to one of two pasta groups: gluten-free pasta (GFP) or Zone PastaRx™ (ZP) (%energy from protein/carbohydrate: 6/87 and 36/48 respectively). Participants, blinded to treatment order, were provided two pasta sides daily for 12 weeks and received a basic diet plan for managing daily energy intake to achieve a 1-2 pound weight loss per week. At trial week 6, pasta assignments were switched to the alternate treatment.

**Results:** Twenty participants (51%) completed the trial; however, weight loss was significantly reduced in the second phase of the crossover, invalidating the crossover design. Data are presented for the initial 6-weeks as a parallel arm trial. Weight loss trended greater for participants in the ZP group (n=9) compared to the GFP group (n=11) (time x group interaction, p=0.059, repeated measures ANOVA). However, fat-free mass was raised in the ZP group and reduced in the GFP group (+1.7 kg vs. -0.5 kg, p=0.019 for group x time interaction).

**Conclusions:** These data support the established viewpoint that high protein diets preserve lean mass during weight loss; yet these data represent particularly interesting findings since the pasta dishes were indistinguishable by taste and appearance. With advances in food technology, highly desired high-carbohydrate foods may be modified to more healthful macronutrient profiles.

#### T-P-3106

##### Diet Composition and Genetics: Effects on Weight, Inflammation and Biomarkers

Cheryl Rock *La Jolla California*, Shirley W Flatt *La Jolla CA*, Bilge Pakiz *La Jolla CA*, Brinda Rana *La Jolla CA*, Elizabeth Quintana *La Jolla CA*, Dennis Heath *La Jolla CA*, Loki Natarajan *La Jolla CA*

**Background:** Differential effects of diet composition on weight loss and breast cancer-related mechanistic factors have been suggested to occur in insulin-sensitive vs. insulin-resistant obese women, and genetic polymorphisms may modify response. Walnuts are a good source of polyunsaturated fatty acids, fiber and bioactive components and have been shown to reduce inflammatory markers, a key factor in insulin resistance.

**Methods:** The primary study aim was to test whether there is a differential weight loss response to different dietary macronutrient composition (higher carbohydrate [65% of energy] and lower fat vs. lower carbohydrate [LC, 45% of energy] and higher monounsaturated fat or LC and walnut-rich [18% of energy] higher fat diets) in a weight loss intervention in obese women, depending on insulin resistance status. Secondary aims were to describe effects on biomarkers and identify nutrient-gene interactions that may contribute to differential response.

**Results:** Participants (N=245) had a baseline weight of 89.9(11.5) kg (mean[SD]) and BMI of 33.5(3.3) kg/m<sup>2</sup>. At 6 months, weight data were available for 217 (88.6%) subjects; weight loss was 8.5(6.0), 6.3(5.7), and 7.5(6.1)% for the lower

fat, LC, and walnut-rich diet groups, respectively. When analyzed by insulin resistance status, insulin sensitive women lost less weight on the LC diet than the other two diets ( $P < .05$ ). HDL cholesterol was higher and triglycerides were lower in walnut-rich subjects than in the other groups ( $P < .05$ ), in addition to their having a higher percent RBC alpha-linolenic and linoleic acids ( $P < .01$ ). IL-6 and CRP decreased, and SHBG increased, across all groups in association with weight loss ( $P < .001$ ).

**Conclusions:** Preliminary results suggest that the optimal dietary composition for weight loss may differ across individuals based on insulin resistance status. Inclusion of 1.5 oz/d walnuts in a reduced-energy diet promotes weight loss comparable to standard LC and higher carbohydrate diets but more favorable effects on blood lipids.

#### T-P-3107

**Dietary intake patterns in women with migraine and obesity seeking to lose weight and reduce migraine attacks**  
E. Whitney Evans *Providence Rhode Island*, Richard Lipton *Bronx New York*, B. Lee Peterlin *Baltimore MD*, J. Graham Thomas *Providence Rhode Island*, Hollie Raynor *Knoxville Tennessee*, Kevin O'Leary *Providence RI*, Jelena Pavlovic *Bronx NY*, Rena Wing *Providence RI*, Dale Bond *Providence Rhode Island*

**Background:** Although epidemiological research supports that migraine is comorbid with obesity in women of reproductive age, mechanisms for this association remain unknown. Exploration of behaviors such as usual dietary intake patterns may provide insight, given that diet is implicated in both migraine and obesity. This study is the first to assess dietary intake patterns and their relationship with migraine attacks in obese women with neurologist-confirmed migraine.

**Methods:** Obese women (18-50 yrs old) with migraine seeking behavioral weight loss treatment to help reduce their migraine attacks were enrolled in the Women's Health and Migraine (WHAM) trial. At baseline, participants recorded migraine attack frequency (i.e. migraine days/mo.), duration (hrs), and intensity (0-10 scale) using a 4-week smartphone diary. Usual dietary intake patterns and diet quality, measured by the Healthy Eating Index 2010 (HEI-2010) which assesses adherence to the Dietary Guidelines for Americans, 2010 (DGA), were determined via three 24-hour diet recalls.

**Results:** On average, participants ( $n=93$ ) were  $38.2 \pm 8.1$  yrs old, had  $BMI=35.6 \pm 6.5$  kg/m<sup>2</sup>, and reported  $8.6 \pm 4.9$  migraine days/mo. Attacks lasted  $20.6 \pm 17.1$  hrs on average and had a mean maximum pain severity of  $5.9 \pm 1.5$ . Participants reported consuming  $1657 \pm 495$  calories/day (32% from fat, 17.6% from protein, and 49% from carbohydrate),  $2,790 \pm 876$  mg of sodium,  $3.2 \pm 9.0$  g of alcohol,  $152 \pm 192$  mg of caffeine, and  $5.3 \pm 1.3$  eating occasions/day, on average. Mean total HEI-2010 scores were  $52.2 \pm 10.4$  out of 100 (population mean =  $52.5 \pm 0.9$ ). There were no significant relationships between migraine characteristics and any of the dietary intake patterns or diet quality.

**Conclusions:** A poor quality diet, inconsistent with the DGA, was common among study participants seeking weight loss to help reduce their migraine attacks, although dietary quality and intake patterns were not related to migraine attack frequency, duration, and intensity.

#### T-P-3108

**Differences Between Lean and Obese Individuals in Energy Density, Eating Frequency and Timing of Meals during Ad Libitum Feeding**

Susanne Votruba *Phoenix Arizona*, Mostafa Ibrahim *Boston MA*, Marie Thearle *Phoenix AZ*, Jonathan Krakoff *Phoenix AZ*

**Background:** Elucidating relationships between the energy density of food and eating episodes may provide further insight into the utilization of energy density as a weight management tool.

**Methods:** Volunteers (non-obese:  $N=87$ ,  $BMI=25.4 \pm 3.1$ ; obese:  $N=114$ ,  $BMI=37.2 \pm 5.8$ ) were admitted to the NIDDK in Phoenix, AZ, for 10 days. After 3 days of weight maintaining diet, volunteers ate from a computerized vending machine for 3 days. Energy density (EnDen) was calculated for foods (kcal/g), and stratified in hourly blocks throughout the 24 hours. Two-tailed t-tests assessed differences between lean/overweight and obese. Repeated measures logistic regression determined the odds ratio for each 1 kcal/g change in EnDen on the likelihood of eating again in the subsequent hour(s).

**Results:** EnDen was associated with weight ( $r=0.26$ ), %BF ( $r=0.21$ ), BMI ( $r=0.26$ ), fat intake ( $r=0.48$ ) and total energy intake ( $r=0.24$ ; all  $P < 0.01$ ). Obese and non-obese individuals differed in 3d mean intake ( $4525 \pm 1444$  vs  $3842 \pm 1327$  kcal,  $P=0.0007$ ). On average, obese individuals consumed higher EnDen foods ( $5.1 \pm 0.20$  v  $5.0 \pm 0.2$ ,  $P=0.0001$ ), but did not have more eating episodes/day than non-obese ( $4.9 \pm 1.2$  v  $4.7 \pm 1.3$ ;  $P=0.17$ ). Mean daily EnDen and the number of eating episodes ( $r=-0.18$ ,  $P=0.01$ ) were negatively associated; a 1 kcal/g increase in EnDen corresponded with 8% lower odds of consuming food in each subsequent hour ( $P=0.03$ ).

**Conclusions:** People with greater body fat consumed more energy dense food. Increased EnDen was associated with less eating episodes throughout the day, and increased time intervals between food consumption.

#### T-P-3109

**Does Quality or Quantity of Protein Impact Physical Performance and Body Composition in Elderly? A Human Clinical Trial**

Jesper Mehlsen *Aarhus Denmark*, Bjørn Richelsen *Aarhus C DK*

**Background:** Physical performance and body composition vary much in the elderly. Little is known about the relationship between these parameters and intake of high-quality/quantity diet protein in frail elderly. We address the issue whether poor protein status can explain features of fragility in elderly by examining the correlation between protein intake (total, animal and vegetable) and outcomes in physical performance and lean body mass (LBM).

**Methods:** The study is a human clinical trial on 32 elderly men and women from 60 to 80 years of age. Food intake was measured by a 3-day weighed food record, physical performance by hand grip strength, 6-minutes' walk test and 4-meter gait speed. Body composition was measured by dual-energy X-ray absorptiometry (DXA).

**Results:** We found that LBM was correlated with total protein- ( $r = 0.61$ ,  $P < 0.001$ ), animal protein- ( $r = 0.51$ ,  $P < 0.01$ ) and vegetable protein intake ( $r = 0.42$ ,  $P < 0.05$ ). Hand grip strength was correlated with total protein- ( $r = 0.48$ ,  $P < 0.01$ ), animal protein- ( $r = 0.38$ ,  $P < 0.05$ ) and vegetable protein

intake ( $r = 0.37$ ,  $P < 0.05$ ). Data from 6-minutes' walk test and 4-meter gait speed did not correlate with protein intake.

**Conclusions:** Using a 3-day weighed food record, we found a significant correlation between the average amount of dietary protein intake and both LBM and hand grip strength in 32 elderly. We suggest that there is a stronger correlation between animal protein and LBM than between vegetable protein and LBM. We hence corroborate previous research by showing that dietary protein is a key factor in preserving LBM. We find that a 3-day weighed food record is a simple, solid and reliable method for obtaining information of the protein status in the elderly. Our findings will benefit clinicians who may use our method of keeping food records in future research in general and on the status of protein intake in elderly in particular. The role of proteins preserving LBM will be addressed.

#### T-P-3110

##### **Effect of High Intensity Medical Weight Loss Treatment in Severely Obese Older Adults on Physical Function**

Jamy Ard *Winston Salem North Carolina*, Miranda Cook *Winston-Salem North Carolina*, Annette Frain, Gary Miller *Winston-salem North Carolina*, Michael Miller *Winston-Salem NC*, Julia Rushing *Winston-Salem NC*, Kristen Beavers *Winston-Salem NC*, Barbara Nicklas *Winston-Salem NC*

**Background:** Older adults in the highest BMI categories are at high risk of disability. High intensity medical weight loss may be useful to restore physical function quickly. However, greater lean mass loss with faster weight loss could limit potential benefit.

**Methods:** This 6-month pilot trial included 28 adults age 65+ yrs with BMI  $\geq 35$  kg/m<sup>2</sup> randomly assigned to moderate intensity (ModWL) or high intensity (HiWL) weight loss interventions. ModWL participants received a balanced deficit diet (-500 kcal/d, minimum 1200 kcal) designed for approximately 1 lb/week weight loss; HiWL received a low-calorie meal replacement plan (960 kcal/d, 35% kcal as protein) designed for approximately 2-3 lb/week weight loss. Physical function was measured at baseline, 3 and 6 months using the Short Physical Performance Battery (SPPB), 400 m walk, and stair climb. One participant discontinued the study (ModWL); all 28 are included in analyses.

**Results:** The mean age was 70.3 years; baseline BMI was 42.8 kg/m<sup>2</sup>. At 6 months HiWL participants lost approximately twice as much as ModWL (19.1 vs 9.1 kg,  $p=0.003$ ), with slightly, but not significantly, more lean mass loss (Estimated Treatment Difference = -1.7 kg, 95% CI [-4.1, 0.6]). SPPB scores did not change significantly in either group (ModWL = 9.9 to 10.0; HiWL = 10.4 to 10.2, ETD at 6 months = 0.21, 95% CI [-0.80, 1.02]). There was no difference at 6 months in 400 m walk time by treatment group (ModWL = 395.1 to 382.9 sec; HiWL = 389.8 to 389.8 sec, ETD at 6 months = -6.9 sec, 95% CI [-51.0, 37.2]). Stair climb time decreased in HiWL (9.06 to 7.94 sec) but was not significantly different from ModWL (9.56 to 9.34 sec, ETD at 6 months = -1.40 sec, 95% CI [-3.50, 0.66]).

**Conclusions:** Although HiWL produced greater weight loss than ModWL, treatment assignment was not associated with differential changes in physical function. Further study is needed to define specific impacts on function of various weight loss strategies in older adults with severe obesity.

#### T-P-3111

##### **Effect of Tomato Consumption on the Dietary Pattern of Overweight and Obese Adults**

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**Background:** Improving dietary patterns by increasing vegetable intake is recommended by Dietary Guidelines for Americans, but US diets remain low in vegetables. Tomatoes are the predominant vegetable in the 2010 USDA Food Pattern (MyPlate), comprising 82% of the red/orange vegetable subgroup: 4.5 cups/week or 0.65 cup/d at the 2000 kcal level, as described in the 2010 Dietary Guidelines Advisory Committee Report. Usual tomato intake is 0.32 cup/d, thus, Americans under-consume tomatoes by approximately 0.33 cup/d.

**Methods:** To determine the feasibility of increasing total vegetable intake through increased tomato intake, using a parallel design, 116 adults (93 women, BMI  $31.9 \pm 3.0$ ) were randomly assigned to no tomato consumption (NO TOM,  $n=52$ ) or the addition of 1 cup/d of tomato products (TOM,  $n=64$ ) for 12 weeks, with no other dietary changes. Food group intakes were assessed using the Food Patterns Equivalents Database 2009-10. Energy intake was assessed with 3-d diet records.

**Results:** The TOM group achieved mean tomato intake of 1.1 cups/d at week 12, with total vegetable intake increasing from 1.65 pre to 2.21 cups/d post,  $p < 0.001$ . The NO TOM group decreased tomato intake from 0.24 to 0.13 cup/d,  $p < 0.05$ , with unchanged total vegetable intake (1.67 pre and 1.45 cup/d post,  $p > 0.05$ ). Pre to post changes in MyPlate food group intakes between TOM and NO TOM showed differences in total vegetable intake (+0.56 cup/d and -0.22 cup/d, respectively,  $p < 0.001$ ) and the other vegetable subgroup intake (-0.15 cup/d and +0.05 cup/d, respectively,  $p < 0.05$ ). No differences were observed in changes between remaining food groups or components. Addition of tomatoes did not result in greater energy intake;  $1809 \pm 552$  pre vs  $1731 \pm 557$  kcal post,  $p > 0.05$ .

**Conclusions:** Participants successfully added tomatoes to their diets with little change in non-tomato vegetables, energy or MyPlate food groups. The goal of increased total vegetable intake was achieved and nearly reached the USDA MyPlate goal of 2.5 cups/d.

#### T-P-3112

##### **Effect of Weight Loss on Measures of Arterial Compliance: A Systematic Review and Meta-Analysis**

Natalie Blanch *Adelaide SA*, Kristina Petersen *Adelaide SA*, Jennifer Keogh *Adelaide South Australia*, Peter Clifton *Adelaide SA*

**Background:** It has previously been shown that weight loss is associated with a reduction in pulse wave velocity. The aim was to conduct a systematic review and meta-analysis of clinical trials involving adults, to determine the effect of weight loss induced by energy restriction with or without exercise, anti-obesity drugs or bariatric surgery on measures of arterial stiffness and compliance.

**Methods:** A systematic search of Pubmed, EMBASE, MEDLINE and the Cochrane Library was conducted and the reference lists of identified articles were searched to find intervention trials (randomised/ non-randomised) that aimed to achieve weight loss and included the following outcome

measures: cardio-ankle vascular index (CAVI), direct measures of area/diameter related to pressure change (including  $\beta$ -stiffness index, brachial or carotid artery compliance, aortic, carotid or brachial artery distensibility and strain), measures derived from peripheral pulse wave analysis (including augmentation index, augmentation pressure, distal oscillatory, proximal capacitive and systemic compliance) and pulse pressure. Data were analysed using Comprehensive Meta Analysis V2 using random effects analysis. Standardised mean difference (SMD) is reported with negative values indicating improvement.

**Results:** A total of 43 studies, involving 4231 participants, were included in the meta-analysis. Mean weight loss was approximately 11% of initial body weight. Weight loss improved CAVI (SMD -0.48;  $p=0.0001$ ), arterial compliance (SMD=-0.61;  $p=0.0001$ ) and distensibility (SMD -1.1;  $p=0.004$ ), distal oscillatory compliance (SMD=-0.41;  $p=0.03$ ), proximal capacitive compliance (SMD -0.41;  $p=0.03$ ), systemic arterial compliance (SMD -0.7;  $p=0.003$ ) and reflection time (SMD -0.51;  $p=0.001$ ). Augmentation index,  $\beta$ -stiffness index, strain, augmentation pressure and pulse pressure were not significantly changed with weight loss.

**Conclusions:** Weight loss improves some measures of arterial compliance and stiffness.

#### T-P-3113-DT

##### Effectiveness of a Weight-Loss Intervention Based on Individualized Small Changes in Women: Preliminary Results.

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**Background:** Obesity is a public health problem in Mexico, with a prevalence of 37.5% in (13.5% correspond to class II-III). Lifestyle changes are difficult to achieve. The small changes approach in diet and physical activity, unlike conventional treatments, is less rigid and may have advantages for weight loss. As part of a randomized clinical trial, our aim was to evaluate efficacy (weight loss  $\geq 5\%$ ) and improvement in metabolic markers in a 6-month weight control program based on small changes in obese women.

**Methods:** 23 Mexican women, age  $32.0 \pm 5.2$  years, BMI  $39.3 \pm 2.9$ , completed a 6-month weight-loss program which consisted of small changes [general recommendations on diet (no beverages with calories, no snacks and treats, maximum one piece of bread or tortilla in each main meal, and no fried foods) and physical activity, plus strategies to promote compliance (once a week weighing, brushing teeth after meals, eating with no distractions), and general well-being were provided. Initial and final weight, BMI, % body fat, waist circumference, and metabolic markers (fasting glucose and insulin, HOMA-IR, blood lipids, blood pressure) were measured. Changes were assessed by paired t-Test,  $p < 0.05$ . Study had IRB approval and all women gave written informed consent.

**Results:** 60.9% lost  $\geq 5\%$  of initial weight; of these, 17.4% lost more than 10%. We documented a significant decrease in weight, BMI, % body fat ( $p = 0.001$ ), waist circumference ( $p = 0.002$ ), fasting glucose ( $p = 0.017$ ), HOMA-IR ( $p = 0.020$ ), triglycerides ( $p = 0.014$ ) and atherogenic index ( $p = 0.030$ ) at 6

months.

**Conclusions:** The intervention based on individual small changes was effective for weight-loss and improvement of metabolic markers. This approach is less radical than conventional treatments based on structured diets and may be an alternative that best suits the lifestyle of many patients with severe obesity seeking weight control. Supported by: CONACYT SALUD-2011-C01-161612

#### T-P-3114

##### Effects of Including Almonds in an Energy-Restricted Diet on Weight, Body Composition and Visceral Adipose Tissue in Obese Adults

Jaapna Dhillon *West Lafayette Indiana*, Richard Mattes *W. Lafayette IN*

**Background:** Almonds are a good source of protein and monounsaturated fats and their effects on visceral body fat loss, in conjunction with energy restriction, have not been widely examined. Increasing the proportion of protein in an energy-restricted diet enhances satiety, energy expenditure and greater relative fat mass loss. In addition, monounsaturated fats are oxidized preferentially and a diet higher in the unsaturated: saturated fat ratio may preferentially reduce visceral adipose tissue (VAT) during weight loss. The promotion of VAT loss is important clinically as this may translate into a reduction in the risk for metabolic diseases.

**Methods:** Obese adults ( $n=28$ , age:  $36.9 \pm 11.9$  yr, body mass index:  $33.1 \pm 2.7$  kg/m<sup>2</sup>) were randomly assigned to a 12 week energy restricted (500 kcal deficit) almond-enriched diet (AED) (15% energy from almonds,  $n=14$ ) or an energy restricted nut-free diet (NFD) ( $n=14$ ) to assess changes in weight, body composition, and visceral fat. Body composition was assessed using DEXA. VAT was predicted using multivariate anthropometric models.

**Results:** Body weight, trunk fat percent, total fat percent and VAT decreased after 12 weeks on energy restriction ( $p < 0.05$ ). Both groups lost similar amounts of body weight over time. The AED group lost more trunk fat percent and total fat percent over time compared to the NFD group ( $p < 0.05$ ). The AED group also had a greater trend for VAT loss over time compared to the NFD group.

**Conclusions:** Consumption of almonds during a weight loss regimen resulted in greater improvements in trunk and total body composition compared to the nut-free weight loss regimen. If verified in further work, the trend for greater VAT loss with almond consumption coupled with overall improvements in body composition may help to reduce metabolic disease risk.

#### T-P-3115

##### Effects of Weight Cycling and Fitness on Visceral Fat in Overweight and Obese Women

Pamela Swan *Phoenix Arizona*, Karen Moreno *Phoenix Arizona*, Aubrey Smith, Zachary Zeigler *mesa Arizona*

**Background:** Repeated periods of body weight loss and regain have been termed weight cycling (WC). Up to 80% of women may have some degree of WC. WC is associated with increased cardiometabolic risk including increases in visceral fat (VF). Aerobic fitness has strong mitigating effects on cardiovascular disease in obese people. It is unknown if aerobic fitness has a protective influence on WC risk.

**PURPOSE:** To describe the effects WC and aerobic fitness

(VO2) on VF in middle aged overweight and obese women.

**Methods:** This is a cross sectional observation of women aged 20-60 years who completed the Weight and Lifestyle Inventory (WALI). The WALI has been shown to be reliable for number of cycles (times subjects lost >10 lbs) and the total pounds lost ( $r=.87$ ,  $P<0.001$ ). WC Index (WCI) was computed as number of WC x amount of weight lost per cycle. Women were also classified as non WC (NWC,  $N=27$ ), moderate WC (MWC: >3 WC of  $\geq 10$ lb;  $N=18$ ) or severe WC (SWC: >3 WC of  $\geq 20$ lb;  $N=21$ ) to describe differences between groups. VO2max was measured via indirect calorimetry using a ramp protocol on a cycle ergometer. VF and body fat percent (FP) were assessed using dual energy x-ray absorptiometry (DXA). Differences between WC groups were assessed with multivariate GLM procedures and stepwise multiple regression was executed to determine predictors of VF (SPSS, v22).

**Results:** 66 women (age:  $39 \pm 11$  yr; BMI:  $31.4 \pm 7$  kg/M2) completed testing. After correcting for age and FP, VF was higher ( $P=0.006$ ) in SWC ( $1455 \pm 662$  cm3) vs. NWC ( $631 \pm 650$  cm3). When VO2 was added as a covariant, differences between WC groups disappeared ( $P=0.145$ ). VO2 and WC were significant predictors of VF describing over 40% of the variance (Adj.  $R^2 = 0.416$ ).

**Conclusions:** SWC results in a larger accumulation of VF in overweight/obese women compared to NWC. Fitness may be protective of the effects of weight cycling on VF. Increasing VO2max in women with a history of weight cycling is recommended to attenuate excessive VF accumulation.

#### T-P-3116

##### **Efficacy and Safety of High Intensity Medical Weight Loss Treatment in Severely Obese Older Adults**

Jamy Ard *Winston Salem North Carolina*, Miranda Cook *Winston-Salem North Carolina*, Annette Frain, Gary Miller *Winston-salem North Carolina*, Michael Miller *Winston-Salem NC*, Julia Rushing *Winston-Salem NC*, Kristen Beavers *Winston-Salem NC*, Barbara Nicklas *Winston-Salem NC*

**Background:** Older adults in the highest BMI categories are at high risk of disability and death; intentional weight loss may be beneficial but also presents risks (e.g., promoting lean mass loss). There is limited evidence about the efficacy and safety of intensive weight loss strategies that produce faster rates of weight loss in this population.

**Methods:** This 6-month pilot trial included 28 adults age 65+ yrs with BMI  $\geq 35$  kg/m2 randomly assigned to moderate-intensity (ModWL) or high-intensity weight loss (HiWL) interventions. ModWL participants received a balanced caloric deficit diet (-500 kcal/d, minimum 1200 kcal/d) designed for approximately 1 lb/week weight loss; HiWL received a low-calorie meal replacement plan (960 kcal/d, 35% kcal as protein) designed for approximately 2-3 lb/week weight loss. Both groups had weekly behavioral group counseling, medical monitoring, and the same exercise prescription. One participant discontinued the study (ModWL); all 28 are included in analyses.

**Results:** The mean age was 70.3 years; baseline BMI was 42.8 kg/m2. At 6 months, ModWL participants lost 9.1 kg or 7.2% of initial weight compared to a weight loss of 19.1 kg or 15.9% for HiWL, which is a 9 kg greater loss for HiWL (95% CI [3.6, 14.5]). HiWL group lost more total fat mass (Estimated Treatment Difference = -7.7 kg, 95% CI [-11.9, -3.5]) and percent fat (ETD= -3.7%, 95% CI [-5.7, -1.7]) measured by DEXA; lean mass loss was greater for HiWL, but not significantly different between groups (ETD= -1.7 kg, 95% CI

[-4.1, 0.6]). Clinical monitoring labs showed non-critical abnormal results for 82 of 1340 measures for HiWL compared to 48 of 1216 measures for ModWL. There were no differences in adverse events.

**Conclusions:** In this group of severely obese older adults, high-intensity medical weight loss produced a two-fold greater rate of weight loss and more total fat and percent fat loss, but not more lean mass loss, compared to a moderate-intensity weight loss treatment, without a higher rate of adverse events.

#### T-P-3117-DT

##### **Efficacy of Diet, Physical Activity and Behavioral Changes for Weight Loss During at Least 18 Months: A Systematic Review**

Psyche Calderon-Vargas *Tijuana Baja California*, Montserrat Bacardi-Gascon *Tijuana Baja California*, Alfredo Martínez-Alvarado *Tijuana Baja California*, Luis Meza-Gomez *Tijuana Baja California*, Arturo Jimenez-Cruz *Tijuana Not Listed or Not Applicable*

**Background:** We have not found any systematic reviews of studies looking for the effect of diet, physical activity and behavioral modifications with at least 18 month follow-up, having a clinical trial registration number.

**Methods:** Studies were published from January 1st 2005 to March 30th 2015 registered in Medline, PsycINFO, Embase, the Cochrane and Scielo database were searched. RCT with clinical trial registry number of interventions for weight loss among overweight or obese adults with at least 18 months follow-up were included. Potential studies were screened independently and in duplicate. Assessment of bias was conducted with the Cochrane collaboration risk of bias tool.

**Results:** Fourteen trials involving 12,824 individuals between 18-65yo were included. Two studies included diet, seven included behavioral changes, five a combination of diet and physical activity and three included the three strategies. Percentage of body weight change ranged from -7.6% to +7.5%. Follow up range of all studies was between 18 mo to 13y. Weight loss was reported in all but one study. Change differences between interventions and/or control group was significant in six out of 14 studies. The study that reported the most weight loss (-7.6%) was focused on behavioral changes alone and have a follow up of 3y.

**Conclusions:** This review shows that the above interventions result in inconsistent weight loss, with high risk of bias.

#### T-P-3118

##### **Efficacy to Effectiveness: Translating the ICAN Lifestyle Intervention to the Real World**

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**Background:** Translation of lifestyle intervention efficacy trials into effectiveness in clinical practice is sorely needed to advance obesity treatment.

**Methods:** A partnership between Albemarle County (employer), Coventry Health Care (insurer), a local RD and fitness club developed a six-month lifestyle intervention for high risk, obese employees based on the ICAN trial, a RCT of diet and physical activity led by registered dietitians (RD) with demonstrated clinical and cost-effectiveness. Since inception,

two other sites adopted the program for their employees. Each site varied the program based on staff and fitness access but all programs have four core components: individual visits with RD, group class with RD, access to fitness center with personalized support, and collection of a standardized set of outcomes. Innovative aspects of program include bundled payments to clinicians from insurer; telephonic follow up with RD, cost sharing by insurer, employer and employee and program reimbursement incentives based on attendance. Participants (n=361) had pre-and post-weights (WT, kg), waist circumference (WC, cm) and fasting lipids measured. HbA1c was collected at two sites (n=303) and change is reported if baseline HbA1C  $\geq 5.7\%$ . Paired t-test evaluated change pre to post.

**Results:** Baseline BMI was 38.9 ( $\pm 7.0$ ) and top three health conditions were hypertension (44%), hypercholesterolemia (42%) and metabolic syndrome (28%). At 6 months, retention was 90%. Mean WT loss was -6.8 kg ( $\pm 5.7$ ) or -6.4% of initial WT. WT loss of  $\geq 5\%$  was achieved by 56.7% of participants; of these 20.5% lost  $\geq 10\%$ . WC change was -7.2 cm ( $\pm 9.3$ ). Mean (SD) changes in labs: total cholesterol -6.9 ( $\pm 28.3$ ) mg/dL; HDL +1.2 ( $\pm 7.0$ ) mg/dL; triglycerides -29.7 ( $\pm 123.7$ ) mg/dL; LDL -4.8 ( $\pm 27.8$ ) mg/dL; HbA1c -0.25% ( $\pm 0.53$ ). All changes were statistically significant ( $p < 0.01$ ).

**Conclusions:** A clinical trial of lifestyle behavior change can be translated into a real-world intervention program resulting in clinically effective weight management.

#### T-P-3119

##### Evidence for behavioral compensation for weight loss in successful and unsuccessful female dieters

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**Background:** Weight loss may induce behavioral compensations which increase the risk of weight regain in reduced-overweight/obese persons, and decrease the likelihood of subsequent weight loss in those who have experienced weight recidivism. This study explores for compensations in eating and physical activity (PA) behaviors in women successfully maintaining weight loss and those who have relapsed.

**Methods:** 62 women were recruited into 4 groups: reduced-overweight/obese participants (RED, n = 20) with age/BMI matched low-weight controls (LW-CTL, n = 20), and relapsed-overweight/obese participants (REL, n = 11) with age/BMI matched high-weight controls (HW-CTL, n = 11). Eating behavior, psycho-behavioral and PA surveys were completed. Measures included: body composition, basal metabolic rate (BMR), predicted VO<sub>2</sub>max, daily energy and macronutrient intake, and accelerometry.

**Results:** By design, RED participants had maintained weight reductions  $\geq 10\%$  body weight for  $\geq 1$  year, REL participants had lost and regained  $\geq 10\%$  body weight, and CTL participants had no history of significant weight change. RED women reported lower carbohydrate intake ( $p = 0.02$ ), greater protein intake ( $p = 0.04$ ), marginally higher fat intake ( $p = 0.05$ ), greater eating restraint ( $p < 0.01$ ), and more vigorous intensity PA (min/d:  $p = 0.04$ ; kcal/d:  $p = 0.02$ ) than their LW-CTLs. Accelerometry revealed higher moderate-to-vigorous intensity PA (MVPA) (min/d:  $p = 0.01$ ; kcal/d:  $p = 0.01$ ) but a greater degree of total daily energy expenditure over-report ( $p = 0.02$ ) in RED vs LW-CTL women.

**Conclusions:** Weight loss maintenance associates with

heightened behavioral vigilance including greater dietary restraint and increased objectively-measured MVPA, but relates to greater over-report of total daily energy expenditure – a compensatory response for weight reduction posited to potentiate weight relapse. In contrast, persons who have relapsed do not demonstrate measurable compensations in health behavior compared to always-overweight/obese controls.

#### T-P-3120

##### High and Low Protein Energy-Restricted Diets Have Similar Effects on Food Cravings in Overweight/Obese Adults with Type 2 Diabetes

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**Background:** Studies investigating the effect of macronutrient composition on food cravings in type 2 diabetes (T2DM) are lacking. This study compared the effect of a higher-protein (HP) diet to an energy-matched lower-protein (LP) diet on food cravings in overweight/obese adults with T2DM.

**Methods:** Overweight/ obese (BMI  $33.5 \pm 4.8$ kg/m<sup>2</sup>) adults (n=61, aged  $55 \pm 8$  years) with T2DM (HbA1c  $8.1 \pm 1.4\%$ ) were randomized to a HP diet (30% protein, 38% carbohydrate, 29% fat) or a LP diet (21%:53%:23%) for a 12 week weight loss phase followed by a 12 week weight maintenance phase. Body weight, HbA1c and three self-administered questionnaires were assessed at baseline and the end of each phase: Food Craving Inventory (FCI) measuring frequency, the General Food Craving Questionnaires – Trait (G-FCQ-T) and State (G-FCQ-S) measuring psychological traits and responses to specific situations respectively. Data was analysed using a linear mixed effects model and Pearson Correlation.

**Results:** Forty four participants completed the study (HP n=23, LP n=21). There were no significant differences between the groups for changes in any outcomes; therefore they were combined for analysis. There were improvements in body weight ( $-7.7 \pm 4.0$ kg,) and HbA1c ( $-1.4\% \pm 1.1\%$ ) at the end of the weight loss phase ( $p < 0.05$ ). Participants reported low general food cravings at baseline ( $2.1 \pm 0.08$ ; rarely). Overall, there was an improvement in the G-FCQ-T total score ( $-11.5 \pm 2.4$ ,  $p < 0.001$ ) corresponding to a moderate Cohen's effect size (ES)  $d = 0.56$  and there was a 15% reduction in the G-FCQ-S total score ( $-5.4 \pm 2.1$ ,  $p = 0.04$ ,  $d = 0.4$ ) with the largest ES observed in the 'obsessive preoccupation with food' subscale ( $d = 0.55$ ). Moderate positive correlations were seen between changes in weight and changes in cravings for high fats, carbohydrates, fast foods and general food cravings ( $r = 0.34$  to  $0.48$ ,  $p < 0.03$ ).

**Conclusions:** Weight loss when consuming either a higher or lower protein diet was positively associated with improvements in food cravings.

#### T-P-3121

##### Impact of Physician Referral Status on Weight Loss Achieved in an Academic Weight Management Center

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Steger *Kansas City Kansas*, Jaehoon Lee *Lubbock, TX*, Eyad Al-Hihi *Kansas City KS*

**Background:** Obesity is a pandemic with profound impact on public health. Physicians have limited ability to manage obesity in the primary care setting<sup>1,2</sup>. Individuals who have discussed weight with their physician may be more likely to lose weight<sup>3,4</sup>. Physician referrals have been shown to increase weight loss in an adolescent patient population<sup>5</sup>. In adults, attrition rates are high, and those referred to weight management programs by physicians may be less likely to enter treatment<sup>6-7</sup>. The KU Weight Management Program is a research-based center that has recently integrated a clinical practice with the ability to accept physician referrals. The impact of physician referrals on subsequent weight loss in comparison to individuals who were self-referred was evaluated, with the hypothesis that referrals by a physician would result in a greater degree of weight loss among participants.

**Methods:** We conducted a retrospective chart review of 85 patients who had enrolled and completed at least three months in our weight management clinic between March 2014 and April 2015. We reviewed outcomes of weight loss and change in BMI after three months of enrollment.

**Results:** Of the 85 patients reviewed, 32 were physician-referred and 53 were self-referred. Average weight loss was 21.1 pounds, with average change in BMI of 3.5. Physician-referred patients lost an average of 24.3 pounds (-4.1 change in BMI), while self-referred patients lost an average of 189.62 pounds (-3.01 change in BMI). There was no significant difference in outcomes between groups. Physician referred patients were somewhat more likely to enroll in a very low calorie diet protocol (15/32, 47%) than self-referred patients (10/53, 19%).

**Conclusions:** Patients referred by a physician may be more likely to enroll in more calorie restricted diet protocols and may have a trend towards more substantial weight loss, though the differences did not reach statistical significance in this small study. Future study may further evaluate these trends.

#### T-P-3122

##### **Increasing Fruit Intake Does not Reduce Energy Intake Within a Meal**

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**Background:** To reduce energy intake in a meal, low-energy-dense foods (fruits and vegetables) can be increased, high-energy-dense foods (potato chips) can be decreased, or a combination of the two can occur. This investigation examined how increasing portion size of grapes and decreasing portion size of potato chips within a lunch altered intake of these foods, and how these changes impacted intake of all foods and overall energy intake during a lunch in healthy weight adults.

**Methods:** A 4X4 incomplete Latin-square crossover design with a between-subjects factor of order and a within-subjects factor of meal condition (CONTROL[C], INCREASE[I], DECREASE[D], INCREASE+DECREASE[ID]) was implemented in 33 healthy weight adults (22.3±1.9 kg/m<sup>2</sup>, 22.2±3.8 years of age, 73% female). Meal conditions varied portion sizes of grapes (100g [C, D] or 150g [I, ID]) and potato chips (100g [C, I] or 50g [D, ID]) and two sandwiches. Pre- and post-meal intake (g and kcal) was measured to determine intake from each food and total meal energy intake.

**Results:** Mixed factor analyses of variance found a significant ( $p<0.05$ ) interaction of meal condition and food for grams and energy consumed. Participants consumed significantly more grapes in I (121.6 ± 44.5g, 82.9 ± 30.6 kcal) and ID (118.6 ± 38.8g, 81.6 ± 26.8kcal), compared to C (86.3 ± 27.4g, 59.6 ± 18.9kcal). Significant differences in potato chip or sandwich intake were not found among the four conditions. No significant changes in meal energy intake were found: C = 602.5 ± 232.4kcal; I = 611.7 ± 238.4kcal; D = 569.8 ± 156.0kcal; and ID = 617.8 ± 169.8kcal.

**Conclusions:** Increasing grape intake, via increasing portion size, in a meal did not reduce intake of other foods or overall meal energy intake. Intake of potato chips did not decrease when portion size was decreased. Recommendations to increase fruit intake without other dietary changes may not assist with reducing energy intake in a meal.

#### T-P-3123-DT

##### **Late-Night Caloric Intake is Inversely Associated with Serum Glucose among Obese Women at 16-20 Weeks' Gestation**

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**Background:** In a previous study we found that late-night eating in the third trimester was associated with impaired glucose tolerance, particularly among obese women. This finding is consistent with the known adverse metabolic effects of shift-work. In the current study, we tested the hypothesis that late-night eating at 16-20 weeks' gestation would also be associated with high post-challenge glucose and lower whole body insulin sensitivity, particularly among obese women. We also hypothesized that irrespective of BMI, late-night eating would be associated with greater gestational weight gain.

**Methods:** Non-diabetic pregnant women who were lean (BMI: 18.5-24.9kg/m<sup>2</sup>; N=21) or obese (BMI: 30-40kg/m<sup>2</sup>; N=29) in early pregnancy completed food diaries and underwent a liquid meal test at 16-20 weeks' gestation. Late-night food intake was calculated as the total energy consumed between 8pm and 6am. Linear regression models across the whole cohort and within each weight class were calculated to examine whether late-night intake was associated with the glucose response, insulin sensitivity, and insulin secretion, during the liquid meal tests, and with gestational weight gain, independent of BMI and day-time eating.

**Results:** In the obese group only, late-night energy intake was inversely associated with post-meal glucose response, after adjusting for BMI and total daytime intake (partial  $r = -0.53$ ,  $P<0.01$ ). BMI and total daytime intake were independently and inversely associated with whole body insulin sensitivity in the obese group ( $P<0.05$ ). Late-night intake was not associated with whole body insulin sensitivity, insulin secretion, or gestational weight gain for either group.

**Conclusions:** The inverse association of late-night eating and post-challenge glucose at 16-20 weeks' gestation in obese women was unexpected, but may be consequent to a relatively more insulin sensitive state in early-mid pregnancy, which could lower circulating glucose and thereby increase hunger.

#### T-P-3124

##### **Long-Term Effects of a Very low- and High Carbohydrate Diet on Renal Function in Individuals with Type 2 Diabetes**

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**Background:** Concerns exist about the safety of very low carbohydrate, high protein diets on renal function, particularly in populations with type 2 diabetes (T2D) at risk of nephropathy.

**Methods:** Adults with T2D (n=115) without overt kidney disease (BMI 34.6±4.3kg/m<sup>2</sup>, age 58±7yrs, HbA1c 7.3±1.1%, serum creatinine (SCr) 69±15µmol/L, estimated glomerular filtration rate (eGFR-CKD-EPI 94±12ml/min/1.73m<sup>2</sup>) were randomised to consume either a hypocaloric very low carbohydrate, high protein, high fat (LC) diet (14% energy as carbohydrate [CHO<50g/day], 28% protein [PRO], 58% fat [ $<10\%$  saturated fat]) or an energy matched high unrefined carbohydrate, low GI, low fat (HC) diet (53% CHO, 17% PRO, 30% fat [ $<10\%$  saturated fat]); with supervised aerobic/resistance exercise (60mins, 3d/wk). Body weight, blood pressure and renal function—assessed by eGFR, estimated creatinine clearance (Cockcroft-Gault, Salazar-Corcoran) and albumin excretion rate (AER), were measured at weeks 0 and 52.

**Results:** Both groups had similar completion rates (LC=71%, HC=65%). Protein intake calculated from 24h urinary urea was higher in LC (120.1±38.2g/day, 1.3g/kg/day) compared to HC (95.8±27.8, 1g/kg/day), p<0.001). Reductions in weight (mean[95% CI]; -9.3[-10.6, -8.0]kg) and blood pressure (-6[-9, -4]/-6[-8, -5]mmHg) were similar in both groups (P≥0.18). Changes in SCr (LC 3[1,5], HC 1[-1,3]µmol/L, p=0.25) and eGFR (LC -4[-6, -2], HC -2[-3,0]ml/min/1.73m<sup>2</sup>, P=0.25) did not differ between diets. Weight loss reduced AER independent of diet (-2.1[-4.6, 0.5]mg/24h, p=0.24); 6 participants (LC 3, HC 3) had moderately increased AER at baseline (30-300mg/24h), which normalised in 4 participants (LC 2, HC 2) after 52 weeks.

**Conclusions:** Compared with a HC diet, weight loss following 12 months' consumption of an LC does not differently affect clinical markers of renal function in adults with obesity, T2D and no pre-existing kidney disease, suggesting LC diets do not adversely affect renal function any more than conventional HC diets.

#### T-P-3125

##### Portion Control in a Private Psychiatric Hospital

Amanda Clark *Coolangatta Queensland*

**Background:** Currumbin Clinic is a psychiatric hospital with primarily anxiety, depression and detoxification wards. A survey in 2008 indicated 73% of patients reported unwanted weight gain during their stay.

**Methods:** The porcelain "Portion Perfection Plate" was introduced into the food service to convey the messages of nutritional balance, portion control and conscious eating. The Perfect Meals for Patients program is an opt in program and includes patient education via posters, brochures, nutrition sessions, food diaries and clinic orientation manual on the appropriate serving size for lunch and dinner meals. Mid meals are served in standard portion sizes so patients can be confident about their choices. Patients were surveyed every 3 weeks for one year after implementation of the program to ascertain level of awareness, understanding and effectiveness.

Surveys continue less regularly to check maintenance of results.

**Results:** The rate of self reported unwanted weight gain during clinic admission fell from an initial 73% of patients, to 35%. 41% of patients indicate that they actively choose to participate in the program and 80% indicate a high level of confidence that they can continue to implement the strategies after discharge.

**Conclusions:** Portion Control can be effectively available to psychiatric inpatients through the use of portion plates, controlled serving sizes and supportive educational strategies.

#### T-P-3126

##### Randomized Clinical Trial of Portion-Controlled Prepackaged Foods to Promote Weight Loss

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**Background:** Providing prepackaged portion-controlled foods within the context of a reduced-energy meal plan has been suggested to promote more weight loss than standard diet counseling. Satisfaction with food and meal plans is critical for adherence with a weight-loss diet.

**Methods:** The primary aim of this study was to test whether providing portion-controlled prepackaged lunch and dinner entrées in the context of a reduced-energy diet prescription and behavioral counseling promotes greater weight loss at 12 weeks in overweight and obese men and women, compared to control conditions where the prescribed diet is consumed via self-selected foods. Additional aims are to describe the effects on biological factors (lipids, carotenoids, C-reactive protein [CRP]), cardiopulmonary fitness, meal satisfaction, and eating attitudes. One-half of the subjects assigned to prepackaged entrées were provided items with >25% energy from protein.

**Results:** Participants (N=183) had a baseline weight of 95.9(15.6) kg (mean[SD]) and BMI of 33.2(3.5) kg/m<sup>2</sup>. Weight data at study end were available for 180 subjects. Weight loss at 12 weeks for the regular entrée, higher-protein entrée and control groups was 8.6(3.9), 7.8(5.1), and 6.0(4.4)%, respectively (P<.005, intervention vs. control groups). Intervention subjects lost 5.7(3.4) kg body fat (15% of initial body fat) compared with a loss of 4.4(3.3) kg body fat in controls (P=.03 for kg fat loss and P<.01 for % fat loss). Total cholesterol and triglycerides decreased by a mean of 6(25) and 15(46) mg/dL, respectively, in intervention subjects (P<.01).

**Conclusions:** A reduced-energy meal plan incorporating prepackaged portion-controlled entrées promotes greater body weight and fat loss than a comparable meal plan with self-selected foods, as well as favorable effects on blood lipids and CRP. Initial weight loss positively relates to degree of long-term weight loss, so these results are relevant to likelihood of longer term success.

#### T-P-3127

##### Relationship between Body Mass Index and Healthy Eating Index-2010 in Children with Autism Spectrum Disorder

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**Background:** The Healthy Eating Index (HEI) is a widely used measure of diet quality. Poor diet quality is associated with child overweight and obesity. Diet quality using the HEI

has not been evaluated as thoroughly in children with Autism Spectrum Disorder (ASD), who often have restrictive diets and experience feeding problems. This study evaluated whether weight status was related to overall and component HEI scores in children with ASD.

**Methods:** Forty-three children with ASD (Mage= 5.61, MBMIz=.529, 72.1% male, 55.8% white) participated. Total calories consumed, ratio of recommended calories consumed, and average HEI-2010 score was obtained through a three day diet diary. Pearson correlations were used to evaluate the association between HEI-2010 scores and BMIz, controlling for total calories consumed and ratio of recommended calories consumed.

**Results:** Greater BMIz was associated with higher HEI score independently ( $r=.432$ ,  $p=.004$ ) and after controlling for average total calories consumed ( $r=.437$ ,  $p=.004$ ) and ratio of recommended calories consumed ( $r=.464$ ,  $p=.002$ ). BMIz was also associated with average Whole Fruit HEI component score ( $r=.332$ ,  $p=.029$ ) and was maintained after controlling for average total calories ( $r=.353$ ,  $p=.022$ ) and ratio of recommended calories ( $r=.362$ ,  $p=.018$ ). No other HEI component scores were related to BMIz.

**Conclusions:** In children with ASD, higher BMIz is related to greater diet quality and consumption of whole fruits, but not other aspects of diet quality (e.g., Total Fruit, Total Vegetables, Greens and Bean, Dairy, Whole Grains, Refined Grains, Sodium, or Empty Calories). However, previous literature suggests that higher BMI relates to poorer diet quality. To date, little work has been done on the use of HEI in special populations, including children and adolescents diagnosed with ASD. Additional work is needed to determine whether the HEI relates to variables important for feeding interventions, such as food variety, and how this may also relate to BMIz.

#### T-P-3128

##### **Sensitivity To the Rewarding Properties of Food and Perceived Stress as Predictors of a Tendency Toward Binge Eating in Individuals with Overweight/Obesity Seeking Behavioral Weight Loss Treatment**

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**Background:** A tendency toward binge eating (BE; a sense of loss of control while eating an objectively large amount of food, measured by the Binge Eating Scale; BES), is common among overweight/obese individuals. However, the degree to which sensitivity to the rewarding properties of food (as measured by the Power of Food Scale; PFS) and perceived stress (as measured by the Perceived Stress Scale; PSS) are associated with BE, particularly among individuals seeking behavioral weight loss (BWL) treatment, is unknown.

**Methods:** Subjects seeking BWL treatment, age 18-70 yrs, with a BMI of 25-45 kg/m<sup>2</sup>, completed the PFS, PSS, and BES prior to treatment. Regression analyses were conducted to determine whether PFS and PSS entered into the model simultaneously (with and without the corresponding interaction term) accounted for significant variance in BES. BMI, age, and gender were tested as potential covariates.

**Results:** Subjects ( $n=328$ ) were 82.4% women, 92.2% Non-Hispanic White with mean±SD age 55.2±9.9 yrs, and BMI 35.3±5.1 kg/m<sup>2</sup>. The threshold for clinically significant BE ( $\geq 18$ ) was met by 29.6% ( $n=99$ ). Regression analysis demonstrated that the PFS (mean±SD 2.7±.9) and PSS

(20.4±6.5) together accounted for significant variance in BES (14.1±7.7;  $R^2=0.49$ ,  $p<.001$ ). Higher PFS ( $b=5.08$ ,  $SE=.34$ ,  $p<.001$ ) and PSS ( $b=.25$ ,  $SE=.05$ ,  $p<.001$ ) were independent predictors of higher BES. Higher PFS (OR=3.91,  $SE=0.19$ ,  $p<.001$ ) and PSS (OR=1.09,  $SE=0.03$ ,  $p=.001$ ) were also associated with greater likelihood of meeting the threshold for clinically significant BE. No interaction between PFS and PSS was observed in these models ( $p's>.05$ ). Controlling for BMI, age, and gender did not alter the results.

**Conclusions:** BE was strongly associated (cross-sectionally) with both sensitivity to the rewarding properties of food and perceived stress in a sample of individuals with overweight/obesity seeking BWL treatment. Prospective studies are needed to identify causal pathways that explain these associations.

#### T-P-3129

##### **The Acute Effect of Dietary Fiber and Calcium on Appetite and Satiety**

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**Background:** Obesity has become more prevalent in the last 20 years. Dietary fibre (DF) and calcium (Ca) as functional food-ingredients are linked through epidemiology to weight-management, but the impact of these as isolated ingredients in obesity is unknown. Objective: To investigate the short-term effects of DF from fenugreek (Fen), and Ca, on appetite, satiety and postprandial metabolism in overweight/obese subjects.

**Methods:** In this appetite experiment, these functional ingredients were given to overweight/obese subjects as part of standardized meals with a concomitant measurement of subjective appetite ratings, acute energy intake (EI), and postprandial metabolism. In each case, the treatment effect was compared to a matched control.

**Results:** Consumption of a fenugreek-enriched drink elevated the plasma glucose levels and remained above fasting levels for 4 hours postprandial ( $p=0.02$ ). This finding was combined with a reduction in energy intake at an ATM ( $p=0.030$ ). However, no significant differences over 24h were observed between treatment groups. Conversely, the Ca-enriched drink reduced EI at the ALM ( $p=0.017$ ), decreased rated prospective consumption ( $p=0.012$ ), hunger ( $p=0.05$ ) and GLP-1 ( $p<0.001$ ).

**Conclusions:** Acute consumption of DF and Ca reduced food intake, indicating an effect on short-term satiety. Our data suggest a weak relationship between satiety and GLP-1 secretion in obese individuals. Further studies are required to determine these mechanisms on appetite and to confirm whether the effect can be maintained in the longer-term.

#### T-P-3130

##### **The Effect on Weight Loss of Week-On, Week Off Intermittent Energy Restriction**

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**Background:** Intermittent partial or complete fasting interspersed with periods of normal food intake has been proposed to be a useful method of weight loss which may have advantages in terms of increased insulin sensitivity as well as fewer dropouts and greater compliance. However there is little long term data available. We have also shown that alternate

weeks of dieting and normal food intake in women is a useful strategy with similar weight loss at 1 year and similar dropouts but we had no blood samples available.

**Methods:** This study is a randomised parallel weight loss intervention for one year. 54 overweight and obese men and women were randomised to continuous energy restriction (CER) and 53 were randomised to dieting for one week with one week on their usual diet (IER). The degree of energy restriction was the same for both active weight loss periods.

**Results:** After 8 weeks for the CER group (n=39) and 16 weeks for the IER (n=34) weight loss was 6.3 ±3.0 and 6.6kg ±2.2 respectively (p=0.7). Dropouts from each group were not statistically different. Weight loss in men and women was the same at 7.3% and 6.7%. No differences were seen in change in % fat -3.4 and -3.0% respectively.

**Conclusions:** At this early time point weight loss and drop outs are the same with both dietary strategies confirming our earlier study. Insulin and glucose and lipid levels at baseline, 3 months and 12 months will be measured at the end of the study.

#### T-P-3131

##### **The Post-Prandial Effects of Fructose Triglyceride, Glucose and Insulin Concentrations.**

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**Background:** Fructose, a nutritive sweetener with a low GI, has been shown in previous studies to elevate triglyceride, especially in beverage form, when compared to glucose. There is limited data available on the effect of fructose in a mixed meal. The aim of this study was to determine the effects of sucrose, fructose and sucralose on triglyceride, glucose and insulin response 4 hours in healthy volunteers.

**Methods:** This study was a randomised cross-over design. Twenty-seven participants with a median age of 40, and a BMI of 26.3kg/m<sup>2</sup> completed the study. Fructose (52g), sucrose (65g) and Sucralose (6g of Splenda) were delivered as muffins with a standardised fat load (66g). Blood samples were taken at baseline and every 30 minutes for 4 hours. Glucose, triglyceride and insulin concentrations over time, AUC and iAUC were analysed.

**Results:** No significant difference was found between the three sweeteners for triglyceride and glucose concentration, AUC and iAUC. A significant difference was found for insulin: treatment (p = 0.001), time\*treatment (p = 0.035), AUC (p = 0.000) and iAUC (p = 0.000). Post hoc analysis showed that fructose had a significantly lower response than either sucrose (p = 0.006) or sucralose (p = 0.041).

**Conclusions:** Fructose at a moderate dose in a solid food did not significantly elevate triglycerides in comparison to sucrose or sucralose. No significant difference in the glycaemic response between the meals was found. These results indicate that these sweeteners can be safely interchanged for solid meals. Fructose showed a lower insulin response which maybe beneficial long-term.

#### T-P-3132

##### **Vitality and Physical Functioning Outcomes from the ENERGY (Exercise and Nutrition Enhance Recovery and Good Health for You) Trial**

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Kathleen Wolin *Chicago IL*, Bilge Pakiz *La Jolla CA*, tim Byers *Arvada CO*, Patricia Ganz *Los Angeles CA*

**Background:** Obesity is a poor prognostic factor and is negatively related to quality of life (QOL) in breast cancer survivors. The ENERGY study is the largest weight loss intervention trial ever completed in breast cancer survivors and aimed to improve vitality and physical function.

**Methods:** 692 overweight/obese (BMI: 25-45 kg/m<sup>2</sup>) breast cancer survivors across the US were randomized to intensive or non-intensive weight loss interventions. The intensive arm received 52 contacts over 1 year via group behavior therapy sessions and telephone counseling, while the non-intensive arm met twice; women were followed for 2 years. Measured weight and self-reported vitality and physical function were measured every 6 months using the SF36. Linear mixed models tested for between-arm differences at each time point controlling for receipt of chemotherapy and time from diagnosis to study entry.

**Results:** Percent losses in body weight in the Intensive vs. Non-Intensive arms were 6.0% vs. 1.5% (p<.0001) at 1 year, and 3.7% vs. 1.3% (p<.0001) at 2 years. Intensive vs. Non-Intensive adjusted mean (SE) scores for vitality at baseline, 6 months, 1 year and 2 year were: 60.5(1.36), 65.1(1.20), 62.2(1.25) and 60.5(1.28) vs. 60.5 (1.37), 62.4(1.23), 61.0(1.29), and 63.2(1.31), showing borderline between-arm differences (p=.0508) at 6 months only. Physical function scores were 82.9(1.31), 82.9(1.16), 82.0(1.20) and 79.9(1.24) vs. 81.9(1.32), 78.4(1.18), 77.6(1.24) and 77.9(1.26) with significance differences observed at 6 months (p=0.01), borderline significance seen at 1 year (p=.0512) and none at 2 years.

**Conclusions:** While positive changes in QOL have been reported in many diet and physical activity trials in cancer survivors, most have been short-term in duration. These longer term data suggest that diet and exercise interventions may improve the trajectory of physical QOL, but that these benefits diminish over time or are mitigated by regains in weight or reduction in physical activity.

#### T-P-3133

##### **Whey Protein Supplementation Improves Body Composition and Cardiovascular Risk Factors in Overweight and Obese Patients: A Systematic Review and Meta-Analysis**

Sikarin Upala *Cooperstown NEW YORK*, Anawin Sanguankeo *Cooperstown NY*

**Background:** Previous literature showed possible benefits of whey protein supplementation in promoting weight loss. However, most studies do not have enough power to show beneficial effects on body composition and cardiovascular disease (CVD) risk factors. This meta-analysis evaluated effects of whey protein in overweight and obese individuals.

**Methods:** We comprehensively searched the databases of MEDLINE, EMBASE, and Cochrane Databases. The inclusion criteria were published randomized control trials comparing whey protein supplementation to placebo or controls in overweight or obese patients. The primary outcome was the differences in the change of body composition (body weight, waist circumference, total fat mass) We also examined change of CVD risk factors as a secondary outcome. Meta-analyses were performed to compare whey protein and its control groups in the study to calculate the mean difference (MD) and

95% confidence interval.

**Results:** From 35 full-text articles, 11 studies were included in the meta-analysis. The duration of treatment of included studies ranged from 4 days to 18 weeks. There was a significant reduction of body composition including body weight (MD= 0.58, 95% CI: 0.33 to 0.83) and total fat mass (MD=1.19, 95% CI: 1.01 to 1.37) favoring whey protein group. There were also improvement in multiple CVD risk factors including SBP (P<0.01), DBP (P<0.01), glucose (P=0.003), HDL-C (P=0.03), and Triglyceride (P<0.01). No significant change in waist circumference, HOMA-IR, LDL-C was found comparing between two groups.

**Conclusions:** Whey protein supplementation seems to improve body weight, total fat mass and some CVD risk factors in overweight and obese patients. More studies on different dosage and duration of whey protein are helpful to assess benefits in overweight or obese individuals.

#### T-P-3134

##### Analysis of the synthetic peptide RM-493, a melanocortin-4 receptor (MC4R) agonist, on cardiovascular parameters in three Phase1b/2a studies

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**Background:** The hypothalamic Leptin-Proopiomelanocortin-MC4R pathway is a critical regulator of appetite and weight regulation. The synthetic MC4R agonist peptide RM-493, a first in class efficacious and well-tolerated MC4R agonist, is ideally positioned for treatment of defects in this pathway. Several previous MC4R agonists caused significant increases in blood pressure (BP) and heart rate (HR). Preclinical evaluations supported that RM-493 did not cause such increases at doses that resulted in weight loss in a primate weight loss study.

**Methods:** Healthy obese patients (BMI $\geq$ 30 kg/m<sup>2</sup>) were enrolled in clinical safety, tolerability and weight loss studies, where systolic [S] and diastolic [D] BP and heart rate (HR) were assessed in three double-blind, randomized, placebo (pbo) controlled parallel group multiple dose studies of RM-493 by 24-hour ambulatory blood pressure (24-hr ABPM) at baseline and at ~1-2 weeks postdose. 24-hr ABPM results were analyzed for each study over the full 24 hours, the daytime and nighttime intervals, for both absolute values and change from baseline compared to placebo. In addition, PK/PD (BP, HR) analyses were conducted.

**Results:** There were 48 patients in Study 1 (32 active; 16 pbo), 25 patients in Study 2 (13 active; 12 pbo), and 55 patients in Study 3 (34 active; 21 pbo), for a total of 128 patients (79 active; 49 pbo). On average, patients lost ~0.9 kg/week of placebo-subtracted weight loss at doses of 1-2 mg/day. There was little, if any evidence of BP or HR change from baseline vs pbo in any study, nor evidence of a PK/PD relationship: for example, Study 3, the largest single study (N=55) showed 1.07 mmHg (90%CI: 3.93, 1.78), 0.44 mmHg (90%CI: 2.29, 1.41), and +0.19 beats (90%CI: 3.09, 3.46) for SBP, DBP, and HR respectively.

**Conclusions:** RM-493, an MC4R agonist that contributes to weight loss without increasing CV parameters, may represent an important therapeutic advance for the treatment of obesity in patients with defects in the hypothalamic Leptin-POMC-MC4R pathway.

#### T-P-3135

##### Assessment of Liver Function in Patients Treated With Lorcaserin (LOR) Alone and in Combination With Immediate-Release Phentermine (PHEN)

John Hoekstra *Richmond Virginia*, Randi Fain, Tony Ma *Woodcliff Lake New Jersey*, Tiffany Kung *Woodcliff Lake New Jersey*

**Background:** Elevated liver enzymes are considered independent predictors of nonalcoholic steatohepatitis<sup>1</sup>; weight loss (WL) is associated with reductions in liver enzymes.<sup>2</sup> In contrast, decreased bilirubin levels are associated with nonalcoholic fatty liver disease<sup>3</sup>; WL is associated with increases in bilirubin levels.<sup>4</sup> This analysis evaluates liver function parameters in a pilot safety study of patients (pts) treated with LOR alone or in combination with 2 doses of PHEN.

**Methods:** In this 12-week, double-blind, randomized, parallel-group study, pts with overweight and obesity (N=238) were randomized to LOR 10 mg BID alone (LOR BID) or in combination with PHEN at either 15 mg QD (LOR BID+PHEN QD) or 15 mg BID (LOR BID+PHEN BID). All pts received diet and exercise counseling. Mean change from baseline in liver function markers—ALT, AST, alkaline phosphatase (AP), and total bilirubin (TB)—at End of Treatment (EOT) are reported for the safety population.

**Results:** Overall, pts in all groups reported decreases in ALT (-2.3, -4.6, and -1.5 IU/L), AST (-1.2, -3.6, and -1.7 U/L), and AP (-3.7, -4.3, and -3.7 IU/L), and slight increases in TB (1.6, 1.5, and 1.1  $\mu$ mol/L) for LOR BID, LOR BID+PHEN QD, and LOR BID+PHEN BID, respectively. Some patients with normal levels at baseline shifted to >upper limit of normal (ULN) for ALT (4.2, 7.9, and 6.8%) and TB (0, 2.6, and 1.4%) for LOR BID, LOR BID+PHEN QD, and LOR BID+PHEN BID, respectively. However, no pts had >3x ULN in ALT, AST, or AP, or >2x ULN in TB.

**Conclusions:** All treatment groups in this study demonstrated improvements in liver function tests at EOT, potentially a function of WL.<sup>1</sup> Campos. *Hepatology*2008;47:1916-23<sup>2</sup>Promrat. *Hepatology*2010;51:121-9<sup>3</sup>Kwak. *ClinMolHepatol*2012;18:383-90<sup>4</sup>Andersson. *Metabolism*2009;58:1109-15Support: Eisai Inc.

#### T-P-3136

##### Budget Impact of Phentermine and Topiramate Extended-Release (PHEN/TPM ER) in Patients Who are Overweight or Obese with Prediabetes or Type 2 Diabetes Mellitus (T2DM)

Sunil Karnawat *Mountain View California*, Sarah Odeh *Mountain View California*, Santosh Varghese *Mountain View CA*

**Background:** As the prevalence of obesity continues to rise, so do associated healthcare costs. This post-hoc analysis estimated the 1-year budget impact of PHEN/TPM ER 7.5/46 mg plus lifestyle modification (LM) in comparison with LM alone.

**Methods:** A 1-year budget impact model was developed for a health plan perspective of pharmacy and comorbidity costs in overweight/obese patients with prediabetes or T2DM. Total budget impact was the cost of PHEN/TPM ER minus cost offsets from changes in body mass index (BMI) and rate of progression to T2DM. The model was based on data from CONQUER, a Phase 3, 56-week, randomized, controlled trial.

Comorbidity cost offsets for BMI reductions were calculated by multiplying BMI change with medical (\$170) and pharmacy (\$117) costs per BMI unit. Literature-based estimates were used to calculate the annual cost of treating T2DM (\$8396). Assumptions included: plan sponsor (employer) population (100,000 patients), 10% turnover, 1% PHEN/TPM ER market uptake at a weighted cost per capsule of \$5.90, and \$60 PHEN/TPM ER copay (Tier 3). Costs were based on 2015 US dollars.

**Results:** In this model, patients with prediabetes experienced mean BMI (kg/m<sup>2</sup>) reductions of 4.30 for PHEN/TPM ER vs 2.15 for LM, translating to annual cost offsets of \$1234 vs \$617, respectively. Similarly, patients with T2DM experienced mean BMI reductions of 3.69 for PHEN/TPM ER vs 1.96 for LM, translating to annual cost offsets of \$1059 vs \$563, respectively. The rate of progression from prediabetes to T2DM was 1.9% for PHEN/TPM ER vs 4.2% for LM. The total budget impact of treating patients with prediabetes with PHEN/TPM ER was \$54,171 (\$0.05 per member per month [PMPM]) and for patients with T2DM was \$74,677 (\$0.06 PMPM).

**Conclusions:** The budget impact of adding PHEN/TPM ER in patients who were overweight/obese with prediabetes or T2DM is minimal and the additional cost of PHEN/TPM ER is offset by reduced comorbidity costs.

#### T-P-3137

##### Budget Impact Over 2 Years of Treatment with Phentermine and Topiramate Extended-Release (PHEN/TPM ER) in an Overweight/Obese Population

Sunil Karnawat *Mountain View California*, Sarah Odeh *Mountain View California*

**Background:** PHEN/TPM ER is approved as an adjunct to lifestyle modification (LM) for chronic weight management in adults with a body mass index (BMI) of  $\geq 30$  or  $\geq 27$  kg/m<sup>2</sup> with  $\geq 1$  weight-related comorbidity such as hypertension (HTN), type 2 diabetes mellitus (T2DM), or dyslipidemia. This post-hoc analysis estimated the 2-year budget impact of treatment with PHEN/TPM ER 7.5/46 mg plus LM vs LM alone.

**Methods:** A 2-year model was developed from a health plan perspective to estimate the total budget impact from PHEN/TPM ER cost and cost offsets from BMI reductions and comorbidity costs for incident cases of HTN, T2DM, and dyslipidemia. BMI changes were modeled from SEQUEL, a 52-week extension of CONQUER, a Phase 3, 56-week trial of PHEN/TPM ER plus LM or LM alone. Cost offsets for BMI reduction were calculated by multiplying BMI change by the medical (\$170) and pharmacy (\$117) cost change per BMI unit. Literature-based estimates were used to calculate the annual cost of treating HTN (\$1594), T2DM (\$8396), and dyslipidemia (\$2498). Assumptions included: plan population (100,000 patients), 10% turnover, 1% PHEN/TPM ER market uptake, \$5.90 PHEN/TPM ER cost per capsule, and \$60 PHEN/TPM ER copay. Costs were based on 2015 US dollars.

**Results:** BMI reductions over 2 years were -4.3 kg/m<sup>2</sup> for PHEN/TPM ER and -2.0 kg/m<sup>2</sup> for LM, translating to cost offsets of -\$1238 and -\$559, respectively. Incidence of HTN (16% vs 19%), T2DM (2% vs 6%), and dyslipidemia (13% vs 24%) were lower for PHEN/TPM ER vs LM, respectively. The total budget impact of adding PHEN/TPM ER was \$428,571 (\$0.18 per member per month [PMPM]) for the labeled indication. As BMI increased ( $\geq 30$ ,  $\geq 35$ , and  $\geq 40$ ), the total budget impact and PMPM cost decreased.

**Conclusions:** The total budget impact of PHEN/TPM ER

treatment over 2 years is minimal and is offset by reduced BMI, medical/pharmacy costs, and reduced incidence rates comorbidities. Further, those with higher BMIs may have a lower budget impact on the employer.

#### T-P-3138

##### Canagliflozin Reduces Body Weight, Body Mass Index and Waist Circumference in Patients with Type 2 Diabetes Mellitus

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**Background:** Most patients with type 2 diabetes mellitus (T2DM) are overweight or obese. Both body mass index (BMI) and waist circumference (WC) are predictors of cardiovascular disease. Canagliflozin (CANA), a sodium glucose co-transporter 2 inhibitor, reduces hemoglobin A1C, systolic blood pressure (SBP), and body weight (BW). This analysis characterizes the effect of CANA on body composition measures in patients with T2DM.

**Methods:** In four 26-week, Phase 3 studies (N=2,313), CANA 100mg and 300mg were compared to placebo (PBO) as monotherapy, dual therapy (add-on to metformin [MET]), and triple therapy (add-on to MET+sulfonylurea [SU] or MET+pioglitazone [PIO]). Endpoints included change from baseline in BW, BMI, and WC and the proportion of patients with T2DM achieving  $\geq 5\%$  weight loss for each study.

**Results:** Dose-related reductions in BW, BMI, and WC were observed with CANA vs PBO in each study. PBO-adjusted changes with CANA 100mg and 300mg ranged from -1.4% to -3.7% for BW (p<0.001 vs PBO in all studies), -0.40 to -1.21 kg/m<sup>2</sup> for BMI, and -0.88 to -2.96 cm for WC (95%CI for CANA-PBO difference excluded 0 in all studies, except for CANA 100mg in add-on to MET+SU study for WC). A greater proportion of patients had  $\geq 5\%$  reduction in BW with CANA 100mg (16-30% across studies) and CANA 300mg (18-39%) compared with PBO (4-8%). PBO-adjusted changes with CANA 100mg and 300mg ranged from -0.6% to -1.2% for A1C (p<0.001 vs PBO in all studies) and from -1.6 to -6.7 mmHg for SBP (p<0.025 vs PBO, except in add-on to MET+PIO study). Overall incidence of adverse events (AEs) was generally similar between CANA and PBO. The most common AEs with CANA were genital mycotic infections and increased urination. The incidence of hypoglycemia was similar between CANA and PBO, except when used with a SU.

**Conclusions:** In addition to improving A1C, BW, and SBP in patients with T2DM, CANA reduced BMI and WC and increased the proportion of patients experiencing  $\geq 5\%$  weight loss, regardless of background antihyperglycemic therapy.

#### T-P-3139

##### Cost Implication of Using Lorcaserin in Weight Management Prior to Bariatric Surgery

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**Background:** Payers may cover bariatric surgery (BaS) for patients with BMI  $\geq 40$  or BMI 35-39.9 with  $\geq 1$  obesity-related comorbidity (ORC). Weight loss (WL) medications prior to BaS may be beneficial to payers and patients if some patients can achieve substantial WL and avoid BaS. This analysis

evaluated the cost implication of lorcaserin, an FDA-approved WL medication, in weight management prior to BaS from payers' perspective.

**Methods:** The cost implication was assessed in a hypothetical US health plan of one million members over a 2-year horizon. Key assumptions: 1) Average cost per BaS = \$29,5171; 2) Patients with  $\geq 25\%$  excess body weight loss (EWL) pre-BaS WL management can avoid BaS; 3) Only BaS and lorcaserin drug costs are included; 4) Only patients who achieve  $\geq 5\%$  weight loss at week 12 continue lorcaserin treatment (WK-12 responders). For modeling purposes, data for lorcaserin were drawn from a subset of patients (BMI  $\geq 40$  or BMI 35-39.9 with  $\geq 1$  ORC) from three clinical trials (BLOSSOM, BLOOM, BLOOM-DM) evaluating the efficacy and safety of lorcaserin for WL.

**Results:** 42.5% of patients with baseline BMI  $\geq 40$  (average BMI 42.3) were WK-12 responders. Among responders, average WL was 10.6% (STD: 6.6%), average EWL was 26.0% (STD: 16.4%), and 47.4% of responders had  $\geq 25\%$  EWL at one year. 49.3% of patients with baseline BMI 35-39.9 and  $\geq 1$  ORC (average BMI 37.2) were WK-12 responders. Among them, average WL was 10.5% (STD: 6.4%), average EWL was 32.5% (STD: 19.8%), and 58.2% had  $\geq 25\%$  EWL. The cost analysis estimated cumulative savings of \$3.996 million over 2 years if patients with  $\geq 25\%$  EWL avoid BaS. **Conclusions:** From a payer's perspective, using lorcaserin for WL prior to BaS may lead to significant cost savings over a 2-year horizon. Real world, long-term evidence is needed, however, to further evaluate the role of lorcaserin for weight management in patients considering BaS.

#### T-P-3140

##### Distribution of Body Weight Changes With Canagliflozin in Patients With Type 2 Diabetes Mellitus

Lawrence Blonde *New Orleans LA*, Kaj Stenlof *Gothenburg*, Albert Fung *Raritan NJ*, John Xie *Raritan NJ*, William Canovatchel *Raritan NJ*, Gary Meininger *Raritan NJ*

**Background:** Canagliflozin (CANA), an SGLT2 inhibitor, lowers plasma glucose in patients with type 2 diabetes mellitus (T2DM) by increasing urinary glucose excretion, which leads to a mild osmotic diuresis and net caloric loss. CANA has been associated with body weight (BW) reductions in patients with T2DM on various background antihyperglycemic agents (AHAs). This analysis examined the distribution of BW changes in two Phase 3 studies of CANA.

**Methods:** In Study 1, patients (N=1450; mean age, 56 y; HbA1c, 7.8%; BMI, 31 kg/m<sup>2</sup>) received CANA 100 or 300 mg or glimepiride (GLIM) as add-on to metformin for 52 weeks. In Study 2, patients aged 55-80 y (N=714; mean age, 64 y; HbA1c, 7.7%; BMI, 32 kg/m<sup>2</sup>) received CANA 100 or 300 mg or placebo (PBO) added to stable background AHAs for 26 weeks. Changes in BW were assessed in the overall population and by quartiles of weight loss in each study.

**Results:** In Study 1, BW reductions were seen with CANA 100 and 300 mg compared with GLIM at Week 52 (-3.7, -4.0, and 0.7 kg). In Study 2, BW reductions were seen with CANA 100 and 300 mg compared with PBO at Week 26 (-2.2, -2.8, and -0.1 kg). Approximately 85% of patients treated with CANA 100 and 300 mg in both studies had a BW reduction  $> 0$  kg versus 32% with GLIM (Study 1) and 54% with PBO (Study 2). Decreases in BW were seen with both CANA doses versus GLIM or PBO across quartiles of weight loss. In Study 1, BW changes with CANA 100 and 300 mg and GLIM were -8.2, -8.5, and -3.5 kg in Q1; -4.1, -4.6, and 0.2 kg in Q2; -

2.0, -2.5, and 2.0 kg in Q3; and 0.5, 0.5, and 5.1 kg in Q4. In Study 2, BW reductions with CANA 100 and 300 mg and PBO were -6.2, -7.1, and -3.3 kg in Q1; -3.1, -3.8, and -0.9 kg in Q2; -1.4, -2.2, and 0.2 kg in Q3; and 0.9, 0.3, and 2.2 kg in Q4.

**Conclusions:** In both studies, patients with T2DM treated with CANA 100 and 300 mg experienced BW reductions compared with GLIM or PBO across weight loss quartiles, with some variability in the amount of weight loss among patients.

#### T-P-3141

##### Effectiveness of Weight Loss Medication Following Bariatric Surgery

Alpana Shukla *New York New York*, Elizabeth Ricks *New York New York*, Louis Aronne *New York New York*

**Background:** Although bariatric surgery can induce significant weight loss in obese patients, persistence of overweight/obesity and weight loss recidivism are commonly observed following weight loss surgery. There is limited data regarding the use/effectiveness of pharmacotherapy in this clinical setting.

**Methods:** In a retrospective study, 69 consecutive patients with overweight/obesity seen at the Comprehensive Weight Control Center, Weill Cornell Medical College, and prescribed one or more weight loss medications after bariatric surgery were identified through an EPIC search. Details of demographics, medical history and weight changes after initiation of pharmacotherapy were recorded by reviewing their electronic medical records.

**Results:** Mean age of patients was 52 years (SD  $\pm$  12.0 years, range 23 to 71 years). 17.4% of patients were male and 82.6% were female. 13.0% of patients had gastric banding, 23.2% had sleeve gastrectomy, 46.4% had Roux-en-Y gastric bypass, and 17.4% had more than one bariatric surgical procedure. 23.9% of patients were treated at weight plateau following bariatric surgery and 76.1% were treated after weight regain. An average of 2 (SD  $\pm$  1) medications were prescribed over a mean treatment period of 26.2 months (SD  $\pm$  25.4 months). Several drug combinations were used including the two most common: metformin (73.9% of patients) and topamax (49.3% of patients) alone or in combination with phentermine. Mean weight loss over the treatment period was 5.4% (SD  $\pm$  10.4%); 24.6% of patients lost  $\geq 10\%$  of total body weight. Mean weight loss in patients treated at plateau and after weight regain was similar.

**Conclusions:** Pharmacotherapy can be a useful adjunct to maximize weight loss following bariatric surgery. The optimal time to introduce weight loss medication may be at weight plateau. Prospective studies are needed to elucidate the effectiveness of pharmacotherapy on maximizing weight loss and countering weight loss recidivism in this post-bariatric surgery population.

#### T-P-3142

##### Effects of Chronic Treatment with Extended-Release Naltrexone/Bupropion (NB) on Markers of Cardiometabolic Risk (CMR) in Overweight/Obese Subjects Achieving $> 5\%$ Weight Loss by Week 16: A Pooled Analysis of Three Phase 3, Double-Blind, Placebo-Controlled Studies

Joyce Riffer *Deerfield IL*, Keely Gilroy *Deerfield IL*, Hung Lam *Deerfield Illinois*, Claire Dybala *Deerfield IL*

**Background:** Modest, sustained weight loss can be associated with clinically meaningful health benefits, including improvements in CMR markers. NB is approved for chronic weight management in overweight and obese patients who lose >5% of baseline (BL) body weight after 16 weeks of treatment (12 weeks at full dose). It is important for physicians, patients, and payers to understand the anticipated health benefits for those who are eligible and adherent to long-term NB therapy.

**Methods:** Data were pooled from three, Phase 3, 56-week studies in overweight/obese, non-diabetic patients. Changes in CMR markers from BL at 56 weeks were assessed in completer NB subjects losing >5% BL body weight at Week 16 (NB responders; N=781) vs. all completer placebo subjects (PBO; N=663) using analysis of covariance and Wilcoxon rank-sum test. BL characteristics were similar between NB responders and PBO in terms of weight (99 vs. 99 kg), BMI (36 vs. 36 kg/m<sup>2</sup>), sex (85 vs. 84% female) and age (46 vs. 46 y).

**Results:** NB responders completing 56 weeks of treatment experienced significantly greater weight loss vs. PBO (-12.4% vs. -2.7%, p<0.001). Multiple CMR markers also improved significantly (p<0.001), including waist circumference (-10.4 cm vs. -3.3 cm), triglycerides (-17.8% vs. +1.4%), HDL (+5.9 mg/dL vs. 0 mg/dL), LDL (-3.5mg/dL vs. +0.1mg/dL), and hsCRP (-42.0% vs. -16.7%). Blood pressure decreased slightly in both treatment arms and did not differ between groups. Heart rate decreased less for NB responders vs. PBO, consistent with the known safety profile (-0.3 bpm vs. -0.8 bpm, p=0.016). The most common adverse events with NB completers were constipation (29.1%), nausea (26.4%), headache (16.6%), and dry mouth (11.8%).

**Conclusions:** In addition to significant weight loss, NB produced meaningful improvements in multiple CMR markers in Week 16 responders who completed 56 weeks of treatment.

#### T-P-3143

##### Effects of Phentermine and Topiramate Extended-Release (PHEN/TPM ER) on Weight Loss (WL) in Patients with a Baseline Body Mass Index (BMI) $\geq 45$ kg/m<sup>2</sup>

Scott Kahan *Washington District of Columbia, W.* Timothy Garvey *Birmingham AL*, Roman Dvorak *Mountain View California*

**Background:** It is generally believed that patients with extreme obesity (BMI  $\geq 45$  kg/m<sup>2</sup>) do not respond to non-surgical WL interventions. Most randomized-controlled trials of WL medications set an upper BMI limit of 40 or 45 kg/m<sup>2</sup>, thereby excluding an important population. This post-hoc analysis evaluated WL in subjects with baseline BMI  $\geq 45$  kg/m<sup>2</sup> in EQUIP, which had no BMI upper limit.

**Methods:** Subjects (n=1267) from a double-blind, placebo-controlled, 56-week Phase 3 clinical study, EQUIP, were randomized to placebo, PHEN 3.75 mg/TPM ER 23 mg (3.75/23), or PHEN 15 mg/TPM ER 92 mg (15/92). Changes in weight and several cardiometabolic parameters (eg, SBP, DBP, HDL-C, triglycerides, and fasting glucose [FG]) were evaluated at Week 56.

**Results:** At baseline, 125 subjects receiving placebo, 63 receiving 3.75/23, and 117 receiving 15/92 had a BMI  $\geq 45$  kg/m<sup>2</sup>, and 58, 39, and 71 subjects, respectively, completed the study. At baseline, mean weight was 141 kg and mean BMI was 51 kg/m<sup>2</sup>. At Week 56, mean percent WL among completers was -2%, -8%, and -15%, respectively (P<.005 vs placebo). In addition, 22%, 64%, and 83% of completers achieved WL of  $\geq 5\%$ , respectively, and 9%, 31%, and 69%

achieved WL of  $\geq 10\%$ , respectively (P<.01 vs placebo, all comparisons). Statistically significant improvement in triglycerides (-16% vs -6%) and FG (-3 mg/dL vs 0.4 mg/dL) were seen in the 15/92 group vs placebo, respectively (P<.05). Similar trends were observed in those with BMI <45 kg/m<sup>2</sup>. SBP, DBP, and HDL-C were improved but not significant. The most common adverse events in this population were comparable to subjects with BMI <45 kg/m<sup>2</sup> and included headache, constipation, dry mouth, and paraesthesia.

**Conclusions:** These data demonstrate that among patients with extreme obesity, treatment with PHEN/TPM ER, in conjunction with lifestyle modifications, achieved significant WL and cardiometabolic improvements. These outcomes were similar to observations in patients with less severe obesity.

#### T-P-3144

##### Efficacy and Safety of the Sufentanil Sublingual Tablet System (SSTS) in Class I and II Obese Patients: The Effect of BMI on Analgesic Response

Harold Minkowitz *Houston TEXAS*, Forrest Ringold, Maurice Jove *decatour ga*, Karen DiDonato *Redwood City CA*, Pamela Palmer *Redwood City CA*

**Background:** An increasing number of patients undergo surgery for obesity-related conditions, such as knee and hip arthroplasty. The physiological differences between obese and normal-weight patients may modify not only procedural analgesic requirements, but also post-operative pain management, which is critical for prevention of complications. The sufentanil sublingual tablet system (SSTS) is a handheld, non-invasive PCA product currently under FDA review for management of moderate-to-severe acute pain. SSTS allows patients to self-administer sufentanil 15 mcg tablets with a 20-minute lockout period and may be well-suited for the obese given patients' ability to self-titrate based on body weight and need.

**Methods:** Data from the Phase 3 development program using SSTS to treat postoperative pain including two randomized, placebo-controlled trials and one open-label, active comparator study vs. IV PCA morphine in major joint replacement or abdominal surgery were integrated for purposes of subpopulation analysis. Analgesic efficacy was assessed using the pain intensity difference to baseline as well as global assessment measures over 48 hours. Safety assessments incorporated adverse events (AEs), vital signs and the use of concomitant medications.

**Results:** 606 patients were randomized to SSTS; 341 non-obese (56%), 141 Class I obese (23%; BMI  $\geq 30$  to <35kg/m<sup>2</sup>) and 123 Class II obese (21%; BMI  $\geq 35$ kg/m<sup>2</sup>). Primary efficacy endpoints were met across all studies with obese and non-obese demonstrating roughly equivalent analgesic responses. There was no difference in number of SSTS doses needed to gain control over pain in the first hour and mean interdosing intervals over 48 hours (96, 80 and 66 min for non-obese, Class I and II, respectively) suggested appropriate self-titration based on weight. AE profiles were similar across BMI sub-groups.

**Conclusions:** In these studies SSTS provided a patient self-administered analgesia modality that was equally effective and well tolerated by patients across all BMI subgroups.

**T-P-3145****Extended-Release Naltrexone/Bupropion-Assisted Weight Loss Results in Greater Improvements in Cardiometabolic Risk Factors in Subjects with Higher Risk at Baseline**

Joyce Riffer *Deerfield IL*, John Ford *Deerfield IL*, Hung Lam *Deerfield Illinois*, Julie Hendrickson *Evergreen Colorado*, Steve Chen *Deerfield IL*, Gerald Reaven *Stanford CA*

**Background:** Cardiometabolic (CM) risk varies widely in equally obese individuals and benefits of weight loss (WL) are accentuated in those at most risk. It would be clinically useful to identify obese individuals at greatest CM risk who stand to gain the most from naltrexone/bupropion (NB)-assisted WL.

**Methods:** Obese non-diabetic subjects were classified using harmonized criteria as metabolic syndrome (MS) positive (MS+) or negative (MS-) then divided into 3 body mass index classes (BMI-kg/m<sup>2</sup>): Class I (30-34.9;n=432); Class II (35-39.9;n=393); Class III (>40;n=275). CM risk factors (CMRFs) and weight were measured at baseline and after 56 weeks of NB treatment. Those changes were compared between MS+ and MS- groups within each BMI class.

**Results:** MS prevalence varied from 25-34% in BMI classes. WL was comparable (8.3-10.4kg) irrespective of MS across all 3 classes. As expected, the CMRF profile was more adverse in the MS+ group. In all 3 BMI classes, greater decreases in mean glucose and median triglycerides (TGs) were seen in the MS+ vs MS- group and differences between the groups were statistically significant (range of between-group differences: glucose -5 to -6.5mg/dl, TGs -23 to -35mg/dl). Insulin, HOMA-IR, HDL-C, and LDL/HDL also improved to a greater degree in MS+ vs MS- groups in all BMI classes and the differences between MS groups were statistically significant in the following BMI classes: insulin and HOMA-IR (II, III), HDL-C (I, III), and LDL/HDL (III). As BMI class increased, more CMRFs improved to a greater degree in MS+ vs MS- groups; the following between-group differences were statistically significant in BMI Class III: median insulin -4uIU/mL, median HOMA-IR -1.2, mean HDL-C 4.6mg/dL, mean LDL/HDL -0.23, median TGs -23mg/dL, mean glucose -6.3mg/dL. Changes in blood pressure were comparable in the 2 groups.

**Conclusions:** Not all obese subjects are at the same CM risk. NB-assisted WL resulted in greater CMRF reduction in subjects with MS irrespective of BMI class and despite comparable WL.

**T-P-3146****Liraglutide 3.0 mg Efficacy and Safety are Similar Across Baseline Edmonton Obesity Staging System (EOSS)****Categories: Post Hoc Analysis**

Robert Kushner *Chicago Illinois*, Raj Padwal *Edmonton AB*, Nick Finer *London London*, Claus Svendsen *Soborg DK*, Christine B Jensen *Soeborg N/A*, Arya Sharma *Edmonton Alberta*

**Background:** Obesity is associated with increased mortality. The SCALE Obesity and Prediabetes (NCT01272219) and SCALE Diabetes (NCT01272232) trials evaluated the efficacy and safety of liraglutide 3.0 mg, as adjunct to diet and exercise, for weight management. This post hoc analysis evaluated weight loss (WL; primary endpoint), secondary endpoints and overall safety from the 2 trials in EOSS subgroups. The EOSS classifies obesity based on comorbidities and functional status and out-performs BMI in predicting mortality (CMAJ

2011;183:e1059).

**Methods:** Adults (BMI  $\geq 27$  kg/m<sup>2</sup> with  $\geq 1$  comorbidity or  $\geq 30$  kg/m<sup>2</sup>) randomized to liraglutide 3.0 mg or placebo were assigned an EOSS score using available data. Week 56 data are for exposed individuals with  $\geq 1$  post-baseline assessment with LOCF.

**Results:** By definition, more individuals with T2D had a baseline EOSS score of 2 or 3, indicating greater risk. Mean age, body weight, BMI and SBP increased with baseline score. Consistently across EOSS stages, greater WL and improvements in cardiometabolic risk factors (A1C, SBP, lipids) and physical function were seen at week 56 with liraglutide 3.0 mg vs. placebo. With liraglutide 3.0 mg WL was 7.4-8.1% in individuals without T2D and 5.8-6.5% in those with T2D. In the placebo group WL was 2.3-3.1% in individuals without T2D and 1.8-3.2% in those with T2D. Treatment effects were generally independent of baseline EOSS score (interaction p-value>0.05). Overall adverse events and serious events were similar across EOSS subgroups. Pulse increased with liraglutide 3.0 mg (1.9-2.6 bpm) vs. placebo (-3.9-0.9 bpm; treatment difference 2.0-6.5 bpm, p<0.05) across EOSS scores.

**Conclusions:** Effects of liraglutide 3.0 mg, as adjunct to diet and exercise, on weight loss, associated metabolic effects, physical function and clinical safety profile were generally consistent across baseline EOSS scores.

**T-P-3147****Liraglutide 3.0 MG in Obese/Overweight Adults with or without Prediabetes with Baseline BMI <35 vs  $\geq 35$  KG/M<sup>2</sup> in the SCALE Obesity and Prediabetes 56-Week Randomized, Double-Blind, Placebo-Controlled Trial**

Xavier Pi-Sunyer *New York NY*, Luc Van Gaal *Edegem Antwerp*, John Wilding *Liverpool Merseyside*, Carel le Roux *Belfield Dublin 4*, Søren Kruse Lilleøre *Soeborg N/A*, Brigitte Claudius *Soeborg Soeborg*, Frank Greenway *Baton Rouge Louisiana*

**Background:** SCALE Obesity and Prediabetes (NCT01272219) randomized 3731 subjects (mean age 45 years, male 22%, mean BMI 38 kg/m<sup>2</sup>, 61% with prediabetes) 2:1 to liraglutide 3.0 mg or placebo (PBO) as adjunct to diet and exercise (D&E) for 56 weeks.

**Methods:** This post hoc analysis compared efficacy and safety results for subjects with BMI < vs  $\geq 35$  kg/m<sup>2</sup> at baseline. The treatment effect of liraglutide across baseline BMI subgroups was evaluated by statistical testing of interaction between treatment and baseline BMI subgroup.

**Results:** Baseline characteristics were similar between liraglutide and PBO subgroups (BMI< vs  $\geq 35$  kg/m<sup>2</sup>) except for body weight (90.1 and 89.9 kg; 115.1 and 115.0 kg) and prevalence of prediabetes (54.0 and 51.1%; 65.3 and 66.1%); both were higher with BMI  $\geq 35$  kg/m<sup>2</sup>. At 56 weeks, greater mean and categorical weight loss were seen with liraglutide vs PBO in both subgroups (mean: -8.2 and -7.9%; -2.7 and -2.6%) as well as greater improvements in systolic BP, FPG, and IWQoL-Lite total score. These treatment effects of liraglutide were all independent of baseline BMI (< vs  $\geq 35$  kg/m<sup>2</sup>; p>0.05), except for the IWQoL-Lite physical function sub-score, which improved more with BMI  $\geq 35$  kg/m<sup>2</sup> (p=0.04). Adverse events (AEs) and serious AEs were generally comparable across BMI subgroups. In both liraglutide subgroups (BMI< or  $\geq 35$  kg/m<sup>2</sup>), more subjects reported nausea (40 vs 40%) than PBO (15 vs 15%). Gallbladder disorders were similar in liraglutide subgroups (18

[2.1%] vs 37 [2.3%] subjects) but higher than PBO (3 [0.7%] vs 7 [0.9%] subjects). Similar results were seen for adjudicated events of acute pancreatitis (liraglutide: 2 [0.2%] vs 5 [0.3%] subjects; PBO: 0 vs 1 [0.1%] subject).

**Conclusions:** The effects of liraglutide 3.0 mg, as adjunct to D&E, on body weight, metabolic control and safety were similar in subjects with baseline BMI < and  $\geq 35$  kg/m<sup>2</sup>.

#### T-P-3148

##### Long-Term Efficacy of Naltrexone/Bupropion, Administered as Recommended in Clinical Practice

Amy Halseth *La Jolla CA*, Brandon Walsh *La Jolla California*, Kevin Shan *La Jolla CA*, Steve Chen *Deerfield IL*

**Background:** Extended-release naltrexone 32 mg/bupropion 360 mg (NB) is approved in the US and EU for chronic weight management as an adjunct to diet and physical activity. Phase 3 studies demonstrated significantly greater weight loss with NB vs placebo in the setting of both standard and intensive lifestyle modification counseling. This study examined the effects of NB combined with a commercially-available telephone/web-based lifestyle intervention program (Group 1), compared with usual care (Group 2; periodic diet and exercise advice), in overweight/obese subjects over 26 weeks, followed by a 1-year extension during which all subjects received NB and lifestyle intervention.

**Methods:** Consistent with NB prescribing information, subjects were required to exhibit  $\geq 5\%$  weight loss after 16 weeks, with no sustained increase in blood pressure (BP), to continue NB treatment. The primary endpoint was weight change at Week 26 (reported previously). This analysis focuses on Week 78 data (total NB treatment duration was 78 weeks for Group 1 and 52 weeks for Group 2). Data from Group 1 and 2 subjects are pooled for the Week 78 analysis.

**Results:** The randomized population (Group 1 N=153, Group 2 N=89) was 84% female, 78% white, with mean age of 47 y and BMI of 36 kg/m<sup>2</sup>. The Week 78 per protocol (PP) population (n=83) was 81% female, 87% white, 48 y, with BMI of 36 kg/m<sup>2</sup>. Major reasons for NB discontinuation were <5% weight loss after 16 weeks of treatment (24%) and adverse events (21%). At 78 weeks, least squares mean change in weight (SE) was similar between PP Group 1 and Group 2 subjects (-9.4[1.1%] and -10.7[1.5%]). In Group 1 and Group 2 pooled, 72%, 46%, and 25% of subjects achieved  $\geq 5\%$ , 10%, and 15% weight loss at Week 78. Mean systolic / diastolic BP was reduced 1-2 mmHg at Week 78. The AE profile was similar to Phase 3 trials.

**Conclusions:** NB, when combined with lifestyle modification and used in a manner consistent with prescribing information, resulted in approximately 10% mean weight loss for up to 78 weeks.

#### T-P-3149

##### Long-Term Outcomes Using Phentermine following a Very-Low Calorie Diet

Judy Loper *Gahanna Ohio*, Edward Baltes *Gahanna Ohio*, Robert May *Columbus Ohio*, Thomas Broyles *Gahanna OH*

**Background:** Subjects following a very-low calorie diet (VLCD) show significant weight loss but studies are needed to examine long-term maintenance of the weight loss using different methods. The purpose of this study was to show the results of VLCD, pharmacotherapy, and lifestyle change in long-term maintenance.

**Methods:** 444 subjects, 370 females and 74 males, were enrolled in the protocol. Subjects either used OPTIFAST TM (800 calories) or a food-based VLCD for a minimum of eight weeks. Following the use of the VLCD, subjects had their diets increased to a low calorie diet (LCD) and were prescribed phentermine HCL (18.75-37.5 mg/day) for the duration of the study. Patients followed up 2-4 times per month, and were seen by a physician and registered dietitian. The counseling included medical monitoring and lifestyle intervention.

**Results:** Mean BMI at baseline was 39.2, age - 47.5 years, and mean body weight- 242.8 pounds. Mean body weight (including dropouts) at the end of the VLCD was 207.3 pounds, at the end of one year-191.8, two years-194.8, three years-196.2, four years- 189.3, and 5 years- 200.1. Subjects tolerated the phentermine well, and the major complaints were elevated blood pressure, heart racing, agitation, sleep disturbances, and dry mouth. The drop-out rate was 75% at year two. In examining the subjects who completed each year, 153 completed year one, and had a weight loss of 15%, 70 year 2 and had a 13.1% weight loss, 44 year 3 and showed a 10% decrease in weight, 29 year 4 and had a 8.1% decrease, and 20 completed year 5 and had a 5.6% decrease in body weight. Not all subjects had the ability to complete 5 years, and are still in active treatment.

**Conclusions:** Although drop out rates were high, those subjects who completed the study showed clinically meaningful weight loss even at 5 years. The 15% weight loss at one year is higher than with anti-obesity medications alone. More research is needed to improve retention in the program, and thus increase the positive results.

#### T-P-3150

##### Lorcaserin Improves Dietary Adherence: New Insights From an Energy Balance Analysis

Diana Thomas *Montclair NJ*, Corby Martin *Baton Rouge LA*, Leanne Redman *Baton Rouge Louisiana*

**Background:** Weight-loss medications are prescribed in the context of lifestyle modification, including energy-restricted (weight-loss) diets and exercise. Effective weight-loss medications promote greater weight loss than placebo, yet it is unclear how much of this effect is due to improved adherence to dietary recommendations. Quantifying dietary adherence with self-reported food intake is inaccurate, though validated mathematical energy-balance models offer a novel method to quantify the effect of medications on dietary adherence.<sup>1</sup>

**Methods:** Energy expenditure in a metabolic chamber, body composition by Dual Energy X-ray Absorptiometry, and weight-change measurements were collected on 52 subjects (lorcaserin, N=27; placebo, N=25) at baseline and after 1 and 8 weeks of treatment in the TULIP study. All participants were prescribed a 600-kcal/day energy deficit. These data were used to calculate the actual energy deficit through a validated thermodynamic model that predicts energy intake during weight loss. Actual versus prescribed energy deficits were compared. Also, participants were classified as responding to treatment or not via a newly developed validated algorithm.<sup>2</sup>

**Results:** The actual energy deficit achieved by the lorcaserin-treated group was -487.6  $\pm$  647.6 kcal/d. The placebo-treated group achieved a deficit of -286.1  $\pm$  733.8 kcal/d. The percentage of subjects classified as nonresponders in the placebo and lorcaserin groups was 68% and 55%, respectively. **Conclusions:** Lorcaserin improved dietary adherence, which will likely contribute to long-term weight loss success over

lifestyle modification alone.<sup>1</sup> *Am J Clin Nutr* 2010;92:1326-31<sup>2</sup> *Am J Clin Nutr* 2015;101:449-54

**T-P-3151****Network Meta-Analysis of Treatments for Patients with Type 2 Diabetes Mellitus and Obesity**

Lisa Neff *Chicago IL*, Michael Broder *Beverly Hills CA*, David Beenhouwer, Eunice Chang *Beverly Hills CA*, Zhixiao Wang *Woodcliff Lake NJ*

**Background:** When lifestyle changes and metformin fail to produce glycemic control in type 2 diabetes mellitus (T2DM), other anti-diabetic medications (ADM) are used. ADMs reduce glycated hemoglobin (HbA1c), but effect on weight varies.

Lorcaserin (LOR) is indicated as an adjunct for weight reduction in adults with BMI  $\geq 30$  or BMI  $\geq 27$  with  $\geq 1$  weight-related comorbidity. In addition to weight loss, RCTs showed improvement in glycemic control. We did a network meta-analysis (NMA) to compare the impact of adding LOR or other ADM to metformin (MET) on weight and glycemic control.

**Methods:** Systematic review of RCTs (Medline, EMBASE, ISI Web of Science, Cochrane, key abstracts) and NMA. Included studies (published 1990-2014) were of LOR or ADM in T2DM with prior or concurrent MET or sulfonylurea [SU], no basal insulin, parallel group design, compared active treatment to placebo or different active treatment, and reported  $\geq 1$  key outcome (change in weight or HbA1c, % HbA1c  $< 7$ , hypoglycemia). Direct MA was done using DerSimonian and Laird random effect models. NMA was done with Bayesian Markov-chain Monte Carlo random effects models.

**Results:** We screened 6552 articles and included 42 (1 LOR). In 37/42 studies baseline BMI in all study arms was  $\geq 27$ ; in 26 it was  $\geq 30$ . NMA showed LOR was non-inferior to all other agents on HbA1c reduction and % achieving HbA1c  $< 7$ . LOR reduced weight (in kg) significantly more than thiazolidinediones [5.79 (3.99, 7.50)], glinides [5.54 (3.58, 7.69)], SU [5.38 (3.73, 7.10)] and dipeptidyl peptidase-4 (DPP-4) inhibitors [3.20 (1.46, 4.66)]. Its impact on BMI was not statistically different from ADM, though sample sizes for this comparison were small. LOR had significantly lower risk of hypoglycemia than SU and no greater risk than other ADMs. **Conclusions:** Although additional studies are needed, this analysis suggests in a population of patients with BMI  $\geq 27$  who do not achieve glycemic control on a single agent, LOR may be added as an alternative to an add-on ADM.

**T-P-3152****Omega-3 Fatty Acid Treatment in an Obese Patient with Hypertension and Persistently Elevated Triglycerides Despite Statin Therapy: Reductions in Triglycerides and Low-Density Lipoprotein Cholesterol and Improvements in Other Lipid Parameters Following Switch from Omega-3 Fatty Acid Ethyl Esters to Icosapent Ethyl**

Anurag Kedia *Tallmadge Ohio*, Erin Lynch *Tallmadge OH*

**Background:** In patients with dyslipidemia, elevated triglycerides (TG) and cardiovascular risk may remain despite statin therapy. In such patients, there is a need to address this residual risk with add-on therapy. Prescription omega-3 (OM3) fatty acid formulations containing the ethyl esters of eicosapentaenoic acid (EPA) plus docosahexaenoic acid (DHA) (OM3EE) or high-purity EPA ethyl ester (icosapent ethyl; IPE) represent TG-lowering treatments that can be administered in addition to statins.

**Methods:** Here we describe the effects of switching from OM3EE to IPE in a 47-year-old obese male (BMI, 32 kg/m<sup>2</sup>) with dyslipidemia, hypertension, and hypothyroidism.

Throughout the period of this report, the patient was treated stably with medications, including atorvastatin 40 mg/day, extended-release niacin 1000 mg/day, and levothyroxine 175 mcg/day. Due to persistently elevated TG despite statin therapy and other cardiovascular risk factors, including hypertension and obesity, the patient was initiated on OM3EE 4 g/day.

**Results:** After approximately 2 years on OM3EE, total cholesterol was 184 mg/dL, LDL-C was 81 mg/dL, TG were elevated at 307 mg/dL despite statin therapy, non-HDL-C was 144 mg/dL, and HDL-C was 40 mg/dL. Following the switch to IPE, total cholesterol decreased by 34% to 121 mg/dL, LDL-C decreased by 28% to 58 mg/dL, TG decreased by 41% to 180 mg/dL, non-HDL-C decreased by 43% to 82 mg/dL, and HDL-C decreased nominally by 2.5% to 39 mg/dL. Additional improvements were observed in other parameters, including decreases in apolipoprotein B of 39%, C-reactive protein of 43%, and LDL particle concentration of 37%, with a desirable OM3 index of 10%.

**Conclusions:** Thus, in this statin-treated obese patient with persistent high TG, switching from OM3EE containing both EPA and DHA to IPE containing high-purity EPA resulted in beneficial and substantial changes in the lipid profile with a notable reduction of TG along with additional reductions in LDL-C.

**T-P-3153****The Impact of Weight Loss Therapy on Control of Eating: An Exploratory Analysis From a 12-Week Pilot Safety Study**

Frank Greenway *Baton Rouge Louisiana*, Robert Pilson *Woodcliff Lake New Jersey*, Tony Ma *Woodcliff Lake New Jersey*, Tiffany Kung *Woodcliff Lake New Jersey*

**Background:** Weight loss (WL) is often associated with increases in hunger and cravings, which may prevent additional WL and/or promote weight regain.<sup>1,2</sup> The Control of Eating Questionnaire (COEQ) has 20 visual analog scales (VAS) and includes assessments of eating behavior and cravings.<sup>3</sup> COEQ was used to evaluate patients' ability to manage hunger & cravings during WL with lorcaserin (LOR) alone or with 2 doses of immediate-release phentermine (PHEN).

**Methods:** This was a 12-week, double-blind, randomized, parallel-group, pilot safety study in overweight & obese adults. Assessments from the COEQ were included; however, this study was not powered for efficacy. 238 patients (pts) were randomized to receive diet & exercise counseling with LOR 10mg BID alone (LOR BID) or combined with PHEN at either 15mg QD (LOR BID+PHEN QD) or 15mg BID (LOR BID+PHEN BID). COEQ change from baseline (CFB) is reported for the modified intent-to-treat population with observed cases.

**Results:** The COEQ was evaluated for each question individually. In general, responses were similar in all arms, although the magnitude of COEQ CFB tended to be greater in the LOR BID+PHEN arms than LOR BID. Pts in all groups reported an increased control of eating at Week 12, "How difficult has it been to control your eating during the last 7 days?" (CFB, least-squares mean [95% confidence interval], of -16.86 [-21.86, -11.86], -24.83 [-29.64, -20.03] and -32.99 [-38.19, -27.78] mm on VAS for LOR BID, LOR BID+PHEN QD and LOR BID+PHEN BID respectively). Pts also reported

a reduction in the incidence and strength of food cravings.

**Conclusions:** Pts receiving LOR BID alone or in combination with PHEN QD or PHEN BID reported improvements in the COEQ questionnaire at Week 12. Future studies are needed to evaluate the effect of these improvements on chronic weight management.<sup>1</sup>*Drugs*2011;71:2247-55<sup>2</sup>*ISRNObes*2013;2013:210524<sup>3</sup>*Lancet*2010;376:595-605Support: Eisai Inc.

#### T-P-3154

##### **The Impact of Weight Loss Therapy on Food Cravings: An Exploratory Analysis From a 12-Week Pilot Safety Study With Lorcaserin and Phentermine**

Frank Greenway *Baton Rouge Louisiana*, Robert Pilson *Woodcliff Lake New Jersey*, Tony Ma *Woodcliff Lake New Jersey*, Tiffany Kung *Woodcliff Lake New Jersey*

**Background:** Weight loss and maintenance in patients (pts) with overweight and obesity are often compromised by subsequent increases in cravings.<sup>1</sup> The Food Craving Inventory (FCI) is a psychometrically valid 28-item questionnaire consisting of 4 subscales that measure the frequency of specific food cravings. This analysis evaluated the impact of weight loss with lorcaserin (LOR) alone or in combination with 2 doses of immediate-release phentermine (PHEN) on general and specific cravings from the FCI.

**Methods:** This was a 12-week, multicenter, double-blind, randomized, parallel-group, pilot safety study in pts with overweight and obesity. Assessments of food cravings were included; however, this study was not powered for efficacy. Pts (N=238) were randomized to LOR 10mg BID alone (LOR BID) or in combination with PHEN at either 15mg QD (LOR BID+PHEN QD) or 15mg BID (LOR BID+PHEN BID). All pts received diet and exercise counseling. FCI change from baseline to Week 12 is reported for the modified intent-to-treat population with observed cases.

**Results:** Pts in all groups reported reductions in cravings from baseline to Week 12, with total FCI decreases, Least-squares mean (95% confidence interval), of -0.65 (-0.75, -0.55), -0.75 (-0.84, -0.65), and -0.84 (-0.95, -0.74) in LOR BID, LOR BID+PHEN QD, and LOR BID+PHEN BID, respectively. Pts in all groups also showed improvements in specific cravings for high fats, sweets, carbohydrates/starches, and fast-food fats.

**Conclusions:** Pts receiving LOR BID alone or with PHEN reported reductions in food cravings after 12 weeks of treatment. Additional studies are warranted to determine the impact of reduced cravings on chronic weight management with combination pharmacotherapy.

<sup>1</sup>*NatRevEndocrinol*2010;6:663-4Support: Eisai Inc.

#### T-P-3155

##### **The Nicotinic Acid Analog, Acipimox, Increases Exercise Capacity in Overweight or Obese Subjects with Type 2 Diabetes**

Lauren Dise *Denver CO*, Leah Herlache *Aurora Colorado*, Katie Rogers *Aurora CO*, Jane Reusch *Denver CO*, Judy Regensteiner *aurora colorado*, Irene Schauer *Aurora CO*

**Background:** Obesity and type 2 diabetes (T2D) are associated with insulin resistance, elevated free fatty acid (FFA) levels, mitochondrial dysfunction, and decreased exercise capacity (peak VO<sub>2</sub>). Acipimox, a nicotinic acid analog and NAD<sup>+</sup> precursor, has been shown to decrease FFA levels, acutely improve insulin sensitivity and, recently, to

improve mitochondrial function. We hypothesized that acipimox would improve exercise capacity in T2D.

**Methods:** Overweight or obese subjects with T2D (n=6, age 54.9±7.8 years, BMI 31.2±5.4 kg/m<sup>2</sup>) were enrolled in a double-blind, random-order, placebo-controlled, crossover study of 7-9 days of treatment with acipimox/placebo.

**Results:** Acipimox treatment reduced fasting baseline VO<sub>2</sub> (3.08±0.58 vs 3.49±0.48 ml/kg/min, p=0.034), increased peak VO<sub>2</sub> during maximal exercise testing (19.7±3.1 vs 18.2±2.6 ml/kg/min, p=0.006), and increased work load capacity at anaerobic threshold (75.8±22.9 vs 65.7±26.3 watts, p=0.034). There was no significant difference in steady state VO<sub>2</sub> during exercise at 85% of baseline anaerobic threshold (11.2±2.1 vs 11.4±1.9 ml/kg/min, p=0.237). As the tachyphylaxis to FFA-lowering occurred earlier than previously reported, acipimox did not consistently reduce FFA levels (764.2±500.3 vs 605.8±113.2 uEq/L, p=0.448) or improve insulin sensitivity by hyperinsulinemic euglycemic clamp (M-value: 6.00±1.52 vs 6.04±0.69 mg glucose/kg lean body mass/min/uIU/mL insulin x 100, p=0.940). Triglyceride levels were reduced by acipimox (99±33 vs 134±43 mg/dl, p=0.02).

**Conclusions:** These results suggest that acipimox improves exercise capacity, and that the improvement is not acutely dependent on FFA levels or insulin sensitivity. Increased peak VO<sub>2</sub> may occur through improved mitochondrial function independent of FFA levels and may therefore be unaffected by tachyphylaxis to FFA suppression and potentially clinically significant.

#### T-P-3156

##### **Urinary Catecholamines as a Marker of Lorcaserin Action on Vital Signs**

Leanne Redman *Baton Rouge Louisiana*, Yuhan Li *Woodcliff Lake New Jersey*, Tiffany Kung *Woodcliff Lake New Jersey*, William Shanahan *San Diego California*

**Background:** Blood pressure (BP) & heart rate (HR) reductions occur with weight loss (WL) & have been associated with changes in autonomic nervous system activity (NSA).<sup>1,2</sup> Despite promoting WL, obesity medications, particularly those with intrinsic sympathomimetic activity, do not consistently reduce BP & HR.<sup>3</sup> Lorcaserin (LOR) is a serotonin 2C receptor agonist for chronic weight management in adults. Phase 3 trials with LOR show decreases in BP & HR.<sup>4,5</sup> To determine if LOR's effects on BP & HR could be associated with a reduction in sympathetic NSA (SNSA), we evaluated urinary catecholamines measured in the Phase 2b TULIP trial in LOR-treated patients (pts).

**Methods:** TULIP was a double-blind, randomized, placebo (PBO)-controlled, parallel-group study in overweight & obese pts (N=57) randomized to LOR 10mg BID or PBO in combination with diet & exercise (DE) for 56 days (D); weight maintenance (no changes to DE) was imposed during D1-7.<sup>6</sup> Changes from baseline (BL) in 24hr urine epinephrine (E) & norepinephrine (NE) were assessed at D7 & D56.

**Results:** Mean WL (kg) at D56 was significantly greater with LOR than PBO (-3.8 vs -2.2; p=.01).<sup>6</sup> BP (mmHg) & HR (bpm) were reduced from BL with LOR on D7/D56 (systolic BP: -4.6/-4.1; diastolic BP: -6.6/-2.7; HR: -4.1/-6.3), with significant differences vs. PBO seen only in D7 systolic & diastolic BP.<sup>6</sup> A significant decrease vs. PBO was observed in 24hr NE excretion (nmol/24hr) on D7 (LOR -122.3, PBO -15.7; p<.0001) & D56 (LOR -131.8, PBO -63.0; p=.0009). Urine E was below the limit of quantitation in most samples.

**Conclusions:** LOR use was associated with significant

decreases in NE excretion, suggesting that decreases in BP & HR seen with LOR may be due to a reduction in SNSA.<sup>1</sup>*AmJPhysiol*1995;269:R222-5<sup>2</sup>*JCEM*2005;90:5998-6005<sup>3</sup>*JCEM*2015;100:342-62<sup>4</sup>*PostgrMed*2014;126:7-18<sup>5</sup>*Obesity*2012;20:1426-36<sup>6</sup>*JCEM*2011;96:837-45Support: Eisai Inc.

**T-P-3157**

**5-Year Drug Costs after Gastric Bypass in the Elderly**  
Gustaf Bruze *Stockholm*, Ingmar Näslund *Orebro Sweden*,  
Johan Ottosson *Orebro Orebro Lan*, Martin Neovius  
*Stockholm Stockholm*

**Background:** Little is known about economic consequences of bariatric surgery in the elderly. We aimed to assess change in prescription drug costs over up to 5 years in this patient group.  
**Methods:** In the Scandinavian Obesity Surgery Register (SOREg), we identified 1243 patients 60 years or older who had gastric bypass between 2007 and 2012 (64% women, mean age 62 years, mean BMI 41.0, 43% with drug-treated diabetes). For each surgery case, 10 comparators from the general population were identified and matched by age, sex, and place of residence. Drug costs were retrieved from the nationwide Swedish Prescribed Drug Register from January 1, 2006, until October 31, 2014.

**Results:** During the year before surgery, the mean annual drug cost was \$1743 (SD 2446; median 1068). Diabetes drugs made up 27% (\$475/\$1743) and cardiovascular drugs 18% (\$307/\$1743). The mean annual 1-, 3- and 5-year drug costs were \$1351 (median 818), \$1087 (median 525) and \$1124 (median 560), corresponding to reductions of \$395 (95%CI 308-482) at 1 year, \$691 (95%CI 537-845) at 3 years, and \$664 (95%CI 399-930) at 5 years. The greatest contribution to drug cost reductions compared to baseline were from diabetes drugs at 1 (94%), 3 (55%) and 5 years (48%). In matched general population comparators, drug costs were \$689, \$694, \$612, and \$655 the year before the index date, at 1, 3 and 5 years.

**Conclusions:** Elderly patients show substantial prescription drug cost savings compared to baseline over up to 5 years after gastric bypass, while costs in matched general population comparators were stable during follow-up.

**T-P-3158**

**Assessment and Treatment of Child Overweight (OW) and Obesity (OB) and Related Comorbidities are Associated with Subsequent Weight-Status Improvement in Children in Pediatric Primary Care**

Christy Turer *Dallas Texas*, Sarah Barlow *Houston TX*, Hua Lin *Dallas TX*, David Sarwer *Blue Bell PA*, Glenn Flores *Dallas TX*

**Background:** The 2007 Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent OW and OB recommend that pediatricians conduct BMI screening, address weight-related comorbidities, and reassess weight at follow-up visits. We hypothesized these clinical practices would be associated with weight-status improvement in OW school-age children.

**Methods:** Case-control study using EMR data from 60 pediatric primary-care offices on 9,251 6-12 year-old children with a BMI  $\geq$ 85th percentile. Cases were children whose weight-status improved (BMIz decreased vs. increased/no change) between two visits. Multivariable analyses examined

associations of clinical practices (determined by diagnostic codes and orders) with weight-status improvement, adjusting for BMI category (OW/OB/severe OB), age, gender, race/ethnicity, health insurance, clinic site (academic/community/private), and time interval between first and last visit in the EMR.

**Results:** Weight status improved in 49.8% of 29,003 visit intervals (average visit interval, 162 days). Clinical practices associated with weight-status improvement from one visit to the next included: assessing BMI/weight-related comorbidities at the initial visit (24% of cases vs. 21% of controls, respectively,  $P=.01$ ; AOR, 1.1 [95% CI, 1.01-1.2]) and addressing comorbidities (determined by lab, referral, or medication order) (10% vs. 8%,  $P<.01$ ; AOR, 1.2 [1.1-1.4]). Reassessing weight at the next visit (16% vs. 14%) was not associated with weight-status improvement after adjustment.  
**Conclusions:** Assessing weight/related comorbidities and addressing these comorbidities were associated with greater odds of weight-status improvement. To our knowledge, these data are the first to suggest that certain Expert Committee recommendations to assess and treat OW/OB and related comorbidities are associated with modest weight-status improvement; greater adoption of these recommendations has the potential to improve the weight status of school-age children.

**T-P-3159**

**Changes in use of antidiabetic, antihypertensive, and hypolipidemic drugs within 36 months after Roux-en Y gastric bypass surgery in the treatment of obesity: A nationwide population-based study**

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**Background:** After Roux-en Y Gastric Bypass (RYGB) surgery, obesity-related complications such as diabetes, dyslipidemia and hypertension may improve or remit with concomitant reduction or discontinuation of associated drugs. While relapse of complications may occur, studies with long-term follow-up are sparse. We investigated long-term changes in use of antidiabetic, antihypertensive, and hypolipidemic drugs among RYGB patients in comparison with drug use in a matched non-RYGB cohort.

**Methods:** From population-based medical databases we obtained complete data on prescription drug use for all 9,908 patients undergoing RYGB in Denmark 2006-10 and for an age, gender and RYGB-date matched (10:1) general population comparison cohort (99,080 persons). We calculated prevalence ratios (PRs), of drug use comparing periods 6 months before and 36 months after the RYGB/index date in both cohorts.

**Results:** The mean age in both cohorts was 40.6 years; 21.7% were male. Use of antidiabetic drugs decreased substantially in the RYGB cohort (16.5% before surgery; 4.6% after 36 months,  $PR=0.28$  (95% confidence interval(CI): 0.25, 0.31)) while use increased slightly in the comparison cohort (1.9% before index date, 2.5% after 36 months,  $PR=1.31$  (95%CI: 1.23, 1.39)). For antihypertensive drugs use also decreased in the RYGB cohort (43.2% before vs. 26.6% after,  $PR=0.61$  (95%CI; 0.59-0.64)) and increased in the comparison cohort (10.1% before vs. 12.5% after,  $PR=1.24$  (95%CI; 1.21 -1.27)). Use of hypolipidemic drugs decreased in the RYGB cohort (14.4% before vs. 7.3% after,  $PR=0.50$  (95%CI; 0.46, 0.55)), and increased in the comparison cohort (3.8% before vs. 5.7%

after, PR=1.48 (95%CI; 1.42, 1.54)).

**Conclusions:** We observed large reductions in the use of antidiabetic, antihypertensive and hypolipidemic drugs 36 months after RYGB, with little indication of relapse during this time period. Nonetheless, overall use of these drugs remained higher among RYGB patients than among age-matched population comparisons.

#### T-P-3160

##### Childhood Characteristics of Adults Undergoing Bariatric Surgery

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**Background:** To determine whether or not patients undergoing bariatric surgery had weight related issues during childhood that predisposed them to morbid obesity as adults. **Methods:** Single centre prospective study between July and December 2014. Patients undergoing bariatric surgery during this period were asked six questions relating to their childhood (0-18 years). 1. Were yo overweight? Did you experience weight related bullying? 3. Did you have and eating disorder? 4. Did you suffer from weight related depression. 5. Did you have overweight parents? 6. Did you have overweight siblings? The same questions were put to a control group of volunteers not undergoing bariatric surgery. Demographic data were calculated on both groups; sex, age, and BMI. Statistical analyses were performed using an unpaired t-test and a Fisher's exact test.

**Results:** There were 51 individuals in the bariatric surgery group and 47 in the control group. The groups did not differ in the proportion of women 40/51 vs 38/47,  $p = 0.807$ , nor mean age 43 vs 46 years,  $p = 0.1325$ . The mean BMI in the surgery group was significantly higher than in the control group 47.5 vs 26.6,  $p < 0.0001$ . The proportion of patients who were overweight in childhood was significantly greater in the surgery group than in the control group 27/51 vs 9/47,  $p = 0.0007$ , odds ratio 4.75. Weight related bullying was more common in the surgery group than in the control group 17/51 vs 5/47,  $p = 0.008$ . Patients undergoing bariatric surgery as adults were no more likely to have had overweight parents, overweight siblings nor a history of childhood eating disorders compared to controls. The incidence of weight related bullying in overweight children was 54%.

**Conclusions:** Overweight children are five times more likely to become morbidly obese adults, but this is independent of obesity in their close family members and was not associated with a higher prevalence of childhood eating disorders. 54% of overweight children are subjected to bullying because of their weight.

#### T-P-3161-DT

##### Does Obesity Status Affect Length of Hospital Stay for Asthma or Appendicitis?

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**Background:** Pediatric obesity has been associated with poorer lung function in patients with asthma and increased perioperative complications and length of stay [LOS] in patients with appendicitis. Therefore, the purpose of this study

was to assess whether BMI-z correlated with inpatient LOS for children with asthma or appendicitis in a large, free standing, urban children's hospital.

**Methods:** Electronic medical records were reviewed for African American [AA] or Non-Hispanic Caucasian [NHC] patients, ages 2-18y, with admitting diagnosis of asthma (ICD-9 code: 493.92) or appendicitis (ICD-9 codes: 540, 540.1, 540.9, 541, 542) in the emergency room, inpatient ward, or ambulatory surgery unit during January-December 2013. Lengths, heights, and weights were considered valid if biologically plausible (within  $\pm 5$  SD). BMI-z was calculated using CDC growth charts. Spearman rank correlation coefficients and Wilcoxon rank sum tests were performed using SAS 9.3.

**Results:** Out of 62,767 total encounters, 34,153 were initial patient visits with valid height, weight, and sex. There were 1,582 unique patients with asthma diagnoses (mean age 7.5  $\pm$  4y; 38% female; 92% AA and 8% NHC). There were 223 initial patient visits with appendicitis diagnoses (mean age 11.5  $\pm$  4y; 38% female; 34% AA and 66% NHC). There was no association between BMI-z and LOS for appendicitis or for asthma diagnoses within the whole cohort as well as sub-cohorts stratified by race and sex.

**Conclusions:** Our data showed no association between BMI-z scores and LOS for asthma or appendicitis. Limitations in the study include human error in measuring and reporting heights and weights and inability to assess LOS in appendicitis with regards to type of appendectomy performed (laparoscopic versus open). Patient severity of illness was not assessed in the study. Further analyses investigating the relationship between obesity and LOS in other common acute and chronic childhood conditions are ongoing.

#### T-P-3162

##### Efficacy of FemiScan Pelvic Floor Therapy System for the Treatment of Urinary Incontinence in Women with Elevated Body Mass Index

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**Background:** Elevated Body Mass Index (BMI) may cause strain on the pelvic floor muscles and in time muscle weakness and urinary incontinence (UI). Pelvic floor Muscle training can be effective; however, women need instruction, motivation and feedback to gain optimal benefit from pelvic rehabilitation. The FDA-approved FemiScan Pelvic Floor Therapy System (PFTS) uses computer software to measure EMG and an in-home programable device to provide training, motivation and feedback. The study was undertaken to document whether the outcomes with the PFTS are related to BMI.

**Methods:** Women with de novo, post-partum, or post-surgical UI (stress, urge or mixed type), who completed a MD-supervised program utilizing the PFTS were included. We collected age, parity, BMI and EMG measurements of the pelvic floor muscle tone at the initiation & at the end of the treatment, and subjective percent improvement in UI at treatment completion. We used paired t-test to compare the EMG and subjective outcomes of women divided into two cohorts; Women with BMI < 25 and BMI  $\geq$  25

**Results:** 237 women initiated PFTS, and 141 (60%) completed the 8 visit protocol. The analysis is based on the patients who completed their course of therapy. Mean age was 53.4 years & 54.7 years, and parity was 2.4 & 2.7 for women with BMI < 25 and BMI  $\geq$  25 respectively (p. NS). In this cohort, there was a

statistically significant increase in peak EMG measurements between the first and final visit, a mean of 12.0+/- 14.2  $\mu$ V ( $p < .001$ ). Furthermore, there was no statistically significant difference in the increase in peak EMG measurements in high and low BMI groups (10.9 +/- 15.3  $\mu$ V, vs. 13.0 +/- 13.0  $\mu$ V,  $p = 0.39$ .) and between subjective improvement and BMI

**Conclusions:** PFTS is a safe and effective treatment for UI in women with elevated BMI. There was no difference in response to treatment as measured by EMG activity in women with higher or lower body mass index. Additionally, there was no correlation between subjective improvements and BMI.

#### T-P-3163

##### **Factors Associated with Women Achieving Clinically Significant Weight Loss in a National, Nonprofit Weight Loss Program for Up to Five Years**

Nia Mitchell *Aurora Colorado*, Anna Furniss *Aurora CO*

**Background:** Clinically significant weight loss (CSWL) is defined as  $\geq 5\%$  loss of initial weight because it is associated with improvements in weight-related comorbidities. Take Off Pounds Sensibly (TOPS) is a national, nonprofit, peer-led weight loss program where the average weight loss is significant for up to five years, but up to half of participants do not achieve CSWL. The purpose of this study is to examine factors associated with CSWL amongst female TOPS participants in the first five years of participation.

**Methods:** Participants were females who joined TOPS from 2005 to 2011, had a birth date recorded in the database, and renewed their annual membership for up to 5 years. The initial dataset contained 52,322 women at year 1 and 8,218 women at year 5. A multivariable log-binomial regression model was used for years 1 to 5 to determine the adjusted relative risk for CSWL for categories in each of the following variables: participant age, initial weight, and number of members per chapter.

**Results:** Over 5 years, age, initial weight, and number of chapter participants were significantly associated with achieving CSWL. Women aged  $\geq 70$  years were 29 to 44% more likely to achieve CSWL than those aged 18 to 44 years. Participants in chapters with  $\geq 25$  members were 5 to 9% more likely to achieve CSWL than those in chapters with  $< 25$  members. Women who weighed 113 to 136 kg were 7 to 22% more likely to achieve CSWL than women who weighed  $< 80$ kg.

**Conclusions:** Female TOPS participants were more likely to achieve CSWL if they were older, heavier, and participating in chapters that had  $\geq 25$  members. Older women may be more successful because they have less competing demands and may be biologically predisposed to lose weight compared to younger women. Chapters with more participants might be more motivating and engaging than those with less. Heavier women may be more successful because the suggested lifestyle changes may be a greater departure from their initial habits than their lighter counterparts.

#### T-P-3164

##### **High Prescription Rates of Drugs that Cause Weight Gain in Overweight School-Age Children in Pediatric Primary Care**

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**Background:** Many drugs cause weight gain (DWG) as a recognized side effect. The extent of their use and association with particular conditions and subsequent weight gain in overweight school-age children is unknown.

**Methods:** This case-control study examined factors associated with DWG use. A 2015 Endocrine Society clinical practice guideline was used to identify DWG (e.g., oral steroids, antipsychotics, beta blockers, etc.). Using electronic medical record (EMR) data from 60 pediatric practices, the prevalence of DWG use was determined in a sample of 6-12 year-old children with BMIs  $\geq 85$ th percentile,  $\geq 1$  visit, and  $\geq 2$  BMIs measured  $\geq 30$  days apart. Cases were those 1) who received  $\geq 1$  DWG (vs. 0) and 2) whose BMIz increased (vs. decreased/no change). Multivariable analyses identified conditions (determined by ICD9 codes) associated with use of  $\geq 1$  DWG and whether use of  $\geq 1$  DWG was associated with BMIz increase from first to last visit, adjusting for age, gender, BMIz, race/ethnicity, health insurance, clinic site (academic/community/private), and duration of EMR data.

**Results:** Of 8,642 overweight children, 29.7% had  $\geq 1$  prescription for a DWG. Conditions associated with greater adjusted odds of DWG use included asthma (AOR, 3.8; 95% CI, 3.4-4.3), prediabetes/type 2 diabetes (2.7; 95% CI, 1.3-5.6), epilepsy (2.3; 95% CI, 1.7-3.1), and psychiatric diagnoses (1.7; 95% CI, 1.3-2.0); whereas hypertension (0.6; 95% CI, 0.4-0.9) was associated with lower adjusted odds of DWG.

Developmental delay, autism, sleep disorders, and PCOS were not associated with DWG use. DWG use was associated with subsequent weight gain (AOR, 1.1; 95% CI, 1.01-1.2).

**Conclusions:** About one-third of overweight children are prescribed DWG, and DWG are associated with a significantly higher risk of subsequent weight gain. The findings suggest that it may be useful for pediatricians to identify drugs that are weight neutral or cause weight loss for overweight children with asthma, prediabetes/type 2 diabetes, epilepsy, and psychiatric diagnoses.

#### T-P-3165

##### **Who Uses Behavioral Weight Loss Programs? Key Gender Differences in Predictors of Participation.**

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**Background:** Almost 80% of patients using the Veterans Health Administration (VA) are overweight or obese. MOVE!, VA's weight loss program, is effective, but only 10% of eligible patients use it. While women are most likely to participate in MOVE!, there is little information on gender differences in predictors of MOVE! use. To inform program development, we examined whether predictors of MOVE! use differed by gender.

**Methods:** Data came from VA's National Patient Care Database. The cohort consisted of all Veterans with at least one ICD-9 code for obesity/overweight in their medical record in fiscal year (FY) 2012, who also used VA outpatient care by day one of FY2012. We used gender-stratified logistic regression to predict the likelihood of using MOVE! at least once in FY2012 as a function of age, VA service connection, race/ethnicity, 9 obesity-related medical conditions, and 9 common mental health conditions.

**Results:** Among the 708,801 men and 60,507 women in this sample, a minority used MOVE! (12% of men, 21% of women  $p < .001$ ). Among men, factors associated with decreased odds

of MOVE! use included: Hispanic ethnicity (OR: 0.81 [0.79, 0.84]), hypertension (OR: 0.94 [0.92-0.95]), dyslipidemia (OR: 0.92 [0.94-0.97]), ischemic heart disease (OR: 0.95 [0.94-0.97]), heart failure (OR: 0.86 [0.83-0.88]), and psychotic disorders (OR: 0.93 [0.87-0.99]). Many results were similar among women, but heart failure and psychotic disorders were not associated with women's MOVE! use. Drug use disorders were associated with increased odds of MOVE! use in men (OR: 1.29 [1.25, 1.33]), but decreased odds of MOVE! use in women (OR: 0.88 [0.80-0.98]).

**Conclusions:** Patients most likely to benefit from MOVE! are least likely to use it. In addition, some predictors of MOVE! use differ across gender. Efforts to increase MOVE! use should focus on patients with hypertension, dyslipidemia, and/or heart disease, with particular attention to Hispanic patients, men with psychotic disorders, and women with drug use disorders.

#### T-P-3166

##### Willingness to Take Weight Loss Medications among Obese Primary Care Patients

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**Background:** Weight loss medications are effective adjunctive therapies in helping patients lose up to 10% of their body weight on average when combined with diet and exercise. Little is known about patients' perception of these medications and how willing they are to take a daily weight loss medication.

**Methods:** We interviewed obese patients (BMI > 35 kg/m<sup>2</sup>) from 4 diverse primary care practices in Boston, MA to assess if they would be willing to take a daily weight loss pill at the recommendation of their doctor. We conducted sequential logistic regression models to identify demographic, clinical, and quality of life (QOL) factors associated with this willingness.

**Results:** Of 331 subjects, 69% were women, 35% were white, 35% were black and 25% were Hispanic; 249 (75%) were willing to take a daily weight loss pill if recommended by their doctor. After adjustment, men were significantly more willing than women [1.18 (95% CI 1.03-1.36)] to take a daily weight loss pill. Diabetes was the only comorbidity associated with willingness to take weight loss med [1.17 ((1.03-1.32)] but only modestly improving model performance (C-statistic increased to 0.60 from 0.59 in the preceding model). In contrast, lower QOL was a stronger significant correlate (C-statistic of 0.65 from 0.60) with scores on the self-esteem and sex-life subscales being the strongest correlates (C-statistic rose from 0.60 to 0.72). The median weight loss required by patients to take a weight loss pill was greater than 10% across all demographic groups and ranged from 14.8 to 24.4% of body weight; only 15% of patients overall were willing to take a weight loss med for a weight loss of 10% or less.

**Conclusions:** A majority of obese primary care patients were willing to take a daily weight loss pill; however, most required more than 10% weight loss in order to consider it worthwhile. Poor QOL, especially low self-esteem and poor sex-life, were the strongest correlates of willingness among the sociodemographic, clinical, and QOL factors examined.

#### T-P-3167

##### A Solution to Employee Weight Management and Improved Health

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**Background:** Baptist Healthcare System is a statewide health system with >15,000 employees. Employee wellness has taken a forefront in recent years with programs and policies surrounding population health. Among overweight and obese adults, each 1-unit increase in body mass index (BMI) yields an additional \$119.70 in medical costs and \$82.60 in drug costs. In 2014, Baptist Health responded by offering and funding a program to promote weight loss and improvement in BMI for associates.

**Methods:** The HMR program, which encompasses intensive lifestyle changes, was offered to employees with a BMI  $\geq 27$  and a waist circumference of  $\geq 35$ in. in females and  $\geq 40$ in. in males. The voluntary participants were screened for height, weight, waist circumference, BMI, blood pressure, total cholesterol, LDL, HDL, triglycerides and fasting blood glucose pre-program and after 13 wks and 9 mos. A post survey was distributed after 9 mos.

**Results:** 46 of 46 individuals completed the program, with a mean age of 51, mean starting weight of 226.9lbs., mean starting waist circumference of 43.8in., and mean starting BMI of 37.4. The mean weight loss for the group after 9mos. was 35.4 lbs. with a BMI reduction of 5.8 and reduction in waist circumference of 4.8in. Biometric data was collected on 23 individuals after completing the 9mo. program. HDL levels for the group increased by a mean of 4mg/dL. Triglycerides decreased by 45.3mg/dL. Mean glucose levels decreased by 10.5mg/dL. Of those who took the post-survey (n=28), participants indicated that their physician had reduced the amount of medication or taken them off medication for diabetes (100%), high blood pressure (56%), and high cholesterol (82%). Of surveyed individuals, employees indicated that their mental status (6), emotional health (5) and energy level (9) had improved.

**Conclusions:** Employers should consider weight management programs that show significant weight loss and overall improvements in employee health and quality of life, which may significantly impact productivity in the workplace.

#### T-P-3168

##### Assessment of Dietary Knowledge in a Population of Self-Reported Diabetics versus Self-Reported Non-Diabetics: A Pomona Community Pilot Study

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**Background:** Medical Nutrition Therapy (MNT) is an integral component of diabetes (DM) prevention and self-management. The American Diabetes Association recommends patients with DM incorporate MNT as part of their comprehensive care plan. Past research has shown that MNT improves metabolic and behavioral health. This study aims to analyze the differences between self-reported diabetics (SRD) versus self-reported non-diabetics (SRND) in understanding how and why diet and nutritional factors influences blood glucose.

**Methods:** At Western Diabetes Institute, Pomona, CA patients were surveyed to identify the differences in nutrition knowledge between SRD vs. SRND. Participants completed a survey assessing knowledge of food groups, portion size, and carbohydrate sources. Descriptive statistics was used to describe patient characteristics. Comparisons of test scores between patients were analyzed using the Student's t-test (significance equals  $p < 0.05$ ).

**Results:** Between June to August 2014, 103 patients (66% female, mean age  $49 \pm 15$  years old, BMI  $31 \pm 7 \text{ kg/m}^2$ , 50% Hispanic) completed the survey. Of 103 patients, 56 reported being SRND, and 47 reported being SRD. Of the patients in the SRND group, and SRD group, 84%, and 55% of patients completed a high school education or higher, respectively. Patients in the SRND group scored higher than those in the SRD (64% vs 53%,  $p < 0.05$ ) when evaluating food groups, portion size, and carbohydrate sources. There were no statistically significant differences between the two groups when exclusively comparing carbohydrate knowledge (SRND = 54% vs. SRD = 47%,  $p > 0.05$ ).

**Conclusions:** Results suggest that patients with DM may have a poor understanding of nutritional factors influencing blood glucose compared to patients without DM. This lack of knowledge may be contributing to obesity and therefore the development of DM in certain groups. Food Groups (including carbohydrate sources) and portion size are important aspects of MNT and DM care.

#### T-P-3169

##### Association of Obesity Gene Variants with Adiposity and Dietary Traits in 1,953 Adolescents

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**Background:** Specific target for most obesity candidate genes discovered by genome-wide association studies remains unclear. They are often highly expressed in hypothalamus indicating their role in energy homeostasis. We aimed to evaluate an association of selected gene variants with adiposity and dietary traits.

**Methods:** Dietary intake was calculated from self-reported 3-day dietary records. Anthropometric parameters (height, weight, waist circumference and their z-scores), total body and trunk fat by bioimpedance, daily dietary intake (total energy, fat, protein, carbohydrate, fiber, calcium) and ten gene variants (TMEM18, SH2B1, KCTD15, PCSK1, BDNF, SEC16B, MC4R, FTO) were analyzed in 1,953 Czech individuals aged 10.0-18.0 years (1,035 normal weight (NW) and 918 overweight/obese (OW/OB)).

**Results:** OW/OB adolescents exhibited a lower energy intake ( $p < 0.001$ ) but a higher percentage intake of fat ( $p = 0.009$ ) and protein ( $p < 0.001$ ) than NW. A lower calcium intake in OW/OB group was further observed ( $p < 0.001$ ). Obesity risk alleles of TMEM18 rs7561317, SEC16B rs10913469 and FTO rs9939609 were related to an increased body weight, BMI and waist circumference ( $p < 0.05$ ). The latter two genes also showed a positive association with fat mass ( $p = 0.010$ ;  $p < 0.001$ ). An association with at least one component of dietary intake was found in 3 of the 10 studied gene variants. The MC4R rs17782313 was negatively associated with protein ( $p = 0.012$ ) and positively with fiber ( $p = 0.032$ ) intake. Risk alleles of BDNF rs925946 and FTO rs9939609 were related to

a lower calcium intake ( $p = 0.001$  and  $0.037$ ). The effect of FTO variant, however, disappeared after the adjustment for BMI ( $p = 0.164$ ).

**Conclusions:** OW/OB adolescents consumed less total energy than their NW counterparts. SEC16B rs10913469 and FTO rs9939609 showed a relation to fat mass content. Finally, our results suggest that common variants in MC4R and BDNF may influence intake of several nutrients. Grants: IGA MZ CR NT/13792-4, MH CZ-DRO 00023761, CZ0123 Norwegian Financial Mechanisms.

#### T-P-3170

##### Associations between Empirically-Derived Dietary Patterns and Anthropometric and Biomarker Outcomes among University Students

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**Background:** Dietary patterns have been linked with health measures, but most studies have evaluated older adults; few have included young adults attending four-year universities.

**Methods:** Dietary data were collected from undergraduates participating in the Tufts Longitudinal Health Study (1998-2007) via Block Food Frequency Questionnaire ( $n = 1323$ ). Dietary patterns were derived using principle components analysis and orthogonal rotation. Scree plots, eigenvalues, factor loadings, and previous studies were used to determine and name the dietary patterns retained. Multivariable regression models were used to examine cross-sectional relationships between dietary pattern scores (DPS) and Body Mass Index (BMI) ( $n = 1323$ ) and lipid biomarkers ( $n = 379$ ). Models were adjusted for age, gender, race, year in school, physical activity (min/d), and total energy intake. Gender was evaluated as an effect modifier, and P values  $< 0.05$  were considered significant. Main effects were reported when no significant interaction was present.

**Results:** Three dietary patterns were identified and labeled as Prudent, Western, and Alcohol. No significant associations between Prudent or Western DPS and anthropometric measures were found. The Alcohol DPS was positively associated with BMI ( $\beta = 0.23$ ). Alcohol and Prudent DPS were positively associated with HDL ( $\beta = 1.89$  and  $\beta = 1.67$ , respectively). Among women, the Western DPS was associated with lower total ( $\beta = -2.99$ ) and LDL ( $\beta = -1.32$ ) cholesterol; and positively associated with triglycerides ( $\beta = 2.19$ ). Among men, the Western DPS was positively associated with total cholesterol ( $\beta = 7.51$ ), LDL ( $\beta = 7.52$ ) and triglycerides ( $\beta = 11.0$ ). **Conclusions:** In these college age students, dietary patterns were not consistently associated with anthropometric measures of adiposity. Among men, greater adherence to a Western pattern was associated with unfavorable lipid biomarkers, suggesting possible increased cardiovascular disease risk.

#### T-P-3171

##### Barriers to Participation in the National School Lunch Program: Perceptions of School Nutrition Staff Students and Parents

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**Background:** The Healthy, Hunger-Free Kids Act of 2010 aims to reduce obesity prevalence through prevention-based

interventions implemented through the National School Lunch Program (NSLP), yet participation in NSLP declined by 1.2 million students within two years after the act's introduction. This study sought to identify NSLP participation barriers from the perspectives of school lunch program employees, students and parents.

**Methods:** Data were collected in September-October 2014 through 8 focus group discussions of 5-7 participants with school nutrition managers and staff, students and parents. Nutrition employees were recruited through emails from school directors with whom researchers had existing collaborations. Students and parents were contacted through phone calls to households and a screener used to select participants based on qualifying variables. All participants were of schools in primarily middle income communities in the Atlanta area. Each received a small stipend for participating. Transcripts were reviewed for themes and a conceptual framework developed to explain influences of NSLP participation.

**Results:** Each participant group reported different NSLP participation barriers. Students' reported barriers are based on food taste and appearance. Parents reported concerns for children's hunger and perceived healthiness of school lunch. The effects of these barriers are in turn influenced by convenience and children's food preferences. Staff and managers reported barriers affecting food preparation which seem out of their control, e.g. strict regulations. All participants' perspectives overlap on core issue of food dissatisfaction.

**Conclusions:** Food dissatisfaction is the single most important NSLP participation barrier. While many nutrition managers perceive new policies as barriers to improving satisfaction, others have identified creative solutions. Efforts to replicate successful strategies among school nutrition programs could increase NSLP participation.

#### T-P-3172

##### **Behaviors and Motivations for Weight Loss in Children and Adolescents**

Callie Brown *Burlington North Carolina*, Joseph Skelton *Winston-Salem North Carolina*, Eliana Perrin *Chapel Hill NC*, Ashley Skinner *Chapel Hill NC*

**Background:** The risk of disordered eating behaviors is higher in children who are overweight or obese, but little is known about motivations for weight loss in children or adolescents. Our objectives were to assess in a nationally representative sample: the weight loss behaviors of children and adolescents, their motivations for weight loss, and the association of weight status with their behaviors and motivations.

**Methods:** We examined data from the National Health and Nutrition Examination Survey (NHANES), focusing on children in the United States aged 8-15, in repeated cross-sections from 2005 to 2011.

**Results:** More than half of participants (N=6117) reported attempting to lose weight at least sometimes, and children who were overweight or obese attempted to lose weight more frequently than children who were a healthy weight. Children used both healthy (exercising, eating less sweets or fatty foods) and unhealthy (skipping meals, dieting, starving) methods for losing weight. The motivation to be healthier was associated with healthy weight loss behaviors. Children motivated by other people or by teasing were more likely to engage in unhealthy weight loss behaviors. The motivations for losing weight differ by weight status.

**Conclusions:** Many children and adolescents attempt to lose weight, using both healthy and unhealthy behaviors. Children's weight loss behaviors differ based on their motivations for weight loss. Future research must examine whether physicians, parents, and teachers can encourage children to have positive motivations for healthy eating and physical activity behaviors, rather than focusing on weight loss itself.

#### T-P-3173-DT

##### **Breakfast Food Choices are Associated with Location Among Urban School-Aged Youth**

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**Background:** Breakfast is thought to have beneficial effects on child academic outcomes. Much less is known about the location and quality of children's breakfast choices. This research evaluated whether breakfast location influences the likelihood of consuming fruits and vegetables (FV) vs. foods high solid fats and added sugars (SOFAS) among urban school-aged youth.

**Methods:** Participants were 4th-6th grade children (n=1371; 51.3% female; 66.5% Black; 78.9% eligible for free/reduced meals) attending urban public schools (n=16) in Pennsylvania. Children self-reported breakfast food choices (16 food categories) at four different locations (home, corner store, school cafeteria, and other). Intake of FV (i.e. fruits, 100% fruit juice, and vegetables) and high SOFAS foods (i.e. chips, candy, and sugar-sweetened beverages) were assessed. Height and weight were measured. Statistical models controlled for race, gender, and grade.

**Results:** Approximately one fifth (17.5%) of children did not eat breakfast (n=240). Of those children who ate breakfast (n=1131), 46.1% ate at home only, 13.2% ate at school only, and 40.7% ate at a combination of locations, including 21.6% who reported eating foods from a corner store. 41.7% of children ate 1 or more FV, and 21.2% ate 1 or more SOFAS foods for breakfast. Compared to students who ate breakfast at home, those who ate at school were more likely to eat FV (OR=1.94 [95% CI 1.29-2.90]), and less likely to eat SOFAS (OR=0.45 [95% CI 0.22-0.93]). Children who reported eating breakfast foods from corner stores (n=244) were 19 times more likely to consume SOFAS (OR=19.43 [95% CI 14.42-26.16]) than those who did not. Neither breakfast location nor food choices were associated with weight.

**Conclusions:** Children who eat school breakfast are more likely to make healthier food choices than those who eat at home. Eating breakfast at the corner store dramatically increases the odds of SOFAS consumption at breakfast. Interventions should focus on encouraging school breakfast.

#### T-P-3174 - Withdrawn

#### T-P-3175

##### **Child Overweight : Can it Tell Us What's Packed for Lunch?**

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**Background:** It is not known if the types and amounts of foods packed by parents in sack lunches for their preschool children, or consumed by these children differ by weight status of the child.

**Methods:** We examined baseline data from the efficacy trial of an intervention to improve the nutritional content of foods packed by parents in their preschool children's sack lunches. 23% of the 584 parent-child dyads with available data were OW. Direct observations were made of the number of servings packed and consumed of key food groups on two randomly selected, non-consecutive weekdays. Repeated measures models were employed to compare amounts of each food group packed and consumed, across OW and normal-weight children.

**Results:** Parents of OW children packed significantly larger amounts of refined grain foods and meat and beans than parents of normal weight children (2.7 vs 2.2 servings,  $p=0.01$  and 1.3 vs 1.1 servings,  $p=0.02$  respectively), as well as smaller amounts of whole grain foods (0.8 vs 1.1,  $p=0.04$ ). These differences were maintained in servings consumed of these foods by OW and normal weight children. While there was little difference in other food groups packed by parents across weight status categories, OW children, compared to normal weight children, consumed larger proportions of sweets packed by parents (61% vs 53%), and smaller proportions of vegetables (47% vs 53%) and whole grains (51% vs 57%) packed by parents. Additional analyses will examine differences in the healthy eating index of foods packed and consumed across weight status categories.

**Conclusions:** Parents of OW children need to be persuaded to reduce the amounts of refined grain and meat and beans that they pack in sack lunches, and increase the amount of whole grain. Since OW children consume a larger proportion of sweet foods and smaller proportions of vegetables and whole grain than normal weight children, parents need to adjust the amounts of these foods that they pack in children's lunches.

#### T-P-3176

##### Child-Parent Food Decision Disagreement in Obese and Lean Children

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**Background:** Many factors influence food choices, and these decisions remain critical to obesity and its comorbidities. We compare food choice concordance in healthy and obese children and parents.

**Methods:** Thirty-two children (ages 8-14) and their moms were recruited from the Kansas City area. After measuring height and weight, children and moms underwent a series of behavioral food decision tasks where they reported subjective overall preference ratings as well as separate ratings of tastiness and healthiness for 60 food images (half unhealthy). We compared child-parent agreement (Fisher's z transformed correlation coefficients) of ratings between obese (BMI > 85th; N=9) and lean children (BMI < 85th; N=22).

**Results:** Child BMI% was positively correlated with moms' BMI,  $r(30) = .49$ ,  $p < .01$ . All three ratings showed positive correlations between children and moms (overall mean  $r = .14$ , tastiness mean  $r = .15$ , healthiness mean  $r = .75$ ). Independent sample t tests showed that the obese child-mom group had

lower agreement on overall preference ratings,  $t(30) = 2.62$ ,  $p < .05$ , and tastiness ratings,  $t(30) = 2.05$ ,  $p < .05$ , compared to the lean child-mom group. There was no significant difference on healthiness ratings,  $t(30) = -.81$ ,  $p = .42$ .

**Conclusions:** Food ratings diverge amongst obese children and mothers. Mothers of obese youth may understand healthy food choices but face significant obstacles in promoting healthy choices in their children. Further studies should examine the process of food decisions to optimize pediatric obesity intervention outcomes.

#### T-P-3177

##### Children's Consumption of Foods from Quick Service Restaurants Determined Using Plate Waste Methodology

Juliana Cohen *North Andover Massachusetts*, Megan Mueller *Boston MA*, Stephanie Anzman-Frasca *Boston MA*, Vanessa Lynskey *Boston MA*, Emilia Matthews *Boston Massachusetts*, Susan Roberts *Boston Massachusetts*, Shanti Sharma *Boston MA*, Christina Economos *Boston MA*

**Background:** It is currently unknown how much food children consume when dining out at quick-service restaurants (QSRs), or if it is feasible to collect this consumption data in restaurants/food courts.

**Methods:** Parents/guardians ( $n=50$ ) who were dining with a child between the ages of 5-10 years in a quick-service restaurant or mall food court at lunch/dinner were recruited to participate in the study. Parents/guardians reported the foods ordered for the child, and the child's leftover foods were weighed at the end of the meal using standard plate waste methodology. Two uneaten samples of every food were also ordered and weighed to determine stable baseline estimates. Analyses were performed using t-tests.

**Results:** On average the ordered meals had 707 calories, 27.0 g total fat, 7.3 g saturated fat, 1212 mg sodium, and 37.7 g of sugar. Children consumed 83.6% of their entrées, 67.7% of their beverages, 64.6% of their side dishes, and 88.7% of their desserts. Thus, children consumed 521 kcal on average, 20.2 g total fat, 5.7 g saturated fat, 947 mg sodium, and 23.3 g of sugar from their overall meals. Only 36% of children had meals ordered from the children's menu, which averaged 20% fewer calories and total fat, 37% less sodium, and similar amounts of saturated fats and sugar compared with meals from the adult menu. This translated to children consuming significantly fewer calories (412 vs. 531 kcal;  $p=0.04$ ) and less sodium (680 vs. 1064 mg;  $p=0.009$ ) when they ate foods from the children's menu compared with the adult menu.

**Conclusions:** It is feasible to collect QSR consumption data among children dining out using plate waste methodology. Children consumed a substantial amount of calories, saturated fat, sodium, and sugar from QSR foods, particularly when meals were ordered from the adult menu.

#### T-P-3178

##### Children's Perspectives on Healthier Side Dish and Beverage Options in Restaurants

Stephanie Anzman-Frasca *Boston Massachusetts*, Meaghan Glenn *Boston MA*, Grace Chan *Boston MA*, Vanessa Lynskey *Boston MA*, Christina Economos *Boston MA*

**Background:** Children frequently consume food and beverages from restaurants, which tend to be more energy-dense than those prepared at home. Previously (2010 data), we provided evidence that children would accept fruit/vegetable

(FV) side dishes at restaurants. The aim of this study was to provide more extensive, updated information regarding children's perspectives on healthier options in restaurants.

**Methods:** Participants were 711 8- to 12-year-old children who completed an online survey in 2014. Data were weighted to be nationally representative. Survey questions asked how happy or unhappy children would be to receive a kids' meal that came with (1) a FV but not fries and (2) milk, water, or flavored water but not soda/pop. Children who indicated that they would be happy or unhappy about these substitutions were asked why; open-ended responses were dummy-coded into categories.

**Results:** Sixty-eight percent of children reported that they would be happy (40.5%) or neutral (27.9%) to receive a FV but not fries, and 81.3% would be happy (51.6%) or neutral (29.7%) to receive milk, water, or flavored water but not soda/pop. Acceptance of these substitutions did not significantly differ by child sex, age, or socioeconomic status. Liking/taste was the most common reason for both happy and unhappy children's responses. Other common reasons were: health (25.1% of those happy about FV substitution), habit (28.5% of those happy about beverage substitution), and wanting a treat (13.2% and 32.5% of those unhappy about FV and beverage substitutions respectively).

**Conclusions:** Children continue to report willingness to accept healthier sides at restaurants; the current results suggest that even more children would accept healthier beverages. Additional demographic differences will be explored and can provide further insights into the views of children at disproportionate risk of obesity. Overall findings support efforts to increase the availability of palatable, healthy kids' menu offerings.

#### T-P-3179

##### Chronic Insufficient Sleep and Diet Quality: Contributors to Childhood Obesity

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**Background:** Many studies support an association of shorter sleep duration with risk of childhood obesity, yet underlying mechanisms remain unclear.

**Methods:** In Project Viva, 1,046 parents reported children's sleep duration at 6m and annually until mid-childhood (7y). The main exposure was a sleep curtailment score (6m-7y) ranging from 0 (maximal curtailment) to 13 (adequate sleep). In mid-childhood, parents reported children's diet; researchers measured height/weight. Multivariable linear regression assessed associations of sleep with diet (Youth Healthy Eating Index [YHEI]); sleep with BMI z-score adjusting for YHEI; and, secondarily, joint associations of sleep and YHEI with BMI.

**Results:** Mean (SD) sleep and YHEI scores were 10.21 (2.71) and 58.76 (10.37). Longer sleep duration was associated with higher YHEI in mid-childhood (0.59 points/unit sleep score; 95%CI: 0.32, 0.86). Though higher YHEI was associated with lower BMI z-score (-0.07 units/10-point increase; 95%CI: -0.13, -0.01), adjustment for YHEI did not attenuate sleep-BMI associations. Children with sleep and YHEI scores below the median (<11 and <60) had BMI z-scores 0.34 units higher (95%CI: 0.16, 0.51) than children with sleep and YHEI scores above the median.

**Conclusions:** While parent-reported diet did not explain

inverse associations of sleep with adiposity, both sufficient sleep and high-quality diets are important to obesity prevention.

#### T-P-3180

##### Comparison of Participants in Nutrition Clubs to Community-Matched Controls in the Greater Boston area

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**Background:** Nutrition clubs (NC) operate in community settings and provide their members with nutrition education and meal replacements for weight management. There are over 100,000 NC globally, but an independent assessment of the impact of these NC has not been carried out previously.

**Methods:** We conducted a cross-sectional pilot study to compare the health status of 100 NC members to 100 matched community controls (MC), matched for age category, gender, BMI category, race/ethnicity, and readiness to make health changes. Dietary intake, physical activity, biometrics, blood measures, health status, quality of life, and psychosocial factors were assessed through interviews and questionnaires. Data from the first 60 NC and 60 MC is presented.

**Results:** Participants were predominantly female (>70%) and Hispanic (58%). No significant differences were observed in mean values for HbA1c, physical activity, depression, systolic blood pressure, and history of metabolic disease between NC members and MC. BMI, waist-to-hip ratio and diastolic blood pressure were slightly higher in the NC members compared to their MC. However, compared to MC, NC members reported being significantly healthier than in the previous year, having lower emotional eating behaviors, lower carbohydrate intake and higher protein intake (41 vs 47% ; 21 vs 16% of energy intake respectively).

**Conclusions:** Potential benefits of being a NC member include diet composition (higher protein intake and lower carbohydrate intake) and eating behavior patterns consistent with strategies that can help with adherence to effective weight regulation practices. (Research supported by Herbalife International.)

#### T-P-3181

##### Consumption of Certain Grain Food Patterns in US Male and Female Children are Associated with Better Nutrient Intakes and Diet Quality and a Reduced Risk of Being Overweight or Obese

Yanni Papanikolaou *Paris ON*, Victor Fulgoni *Battle creek MI*

**Background:** The purpose of this study was to identify commonly consumed grain food patterns in US children (2-18 years-old; N's=4,263 males/4,104 females) and compare nutrient intakes, diet quality, and physiological parameters of subjects in the various grain patterns relative to those who did not consume grain foods.

**Methods:** The USDA food coding system was used to define categories of grains. Cluster analysis using data from the National Health and Nutrition Examination Survey 2005-2010, identified 8 grain patterns (% of population): 1) mixed grains, 2) breads/rolls, 3) quick breads, 4) pasta/cooked cereal/rice, 5) crackers/salty snacks, 6) cakes/cookies/pies, 7) cereals and 8) a no consumption of main grain groups.

**Results:** Energy intake was significantly higher for most grain

patterns vs. no grains (all  $p < 0.01$ ). Compared to no grains, both genders consuming cereals and pasta/cooked cereals/rice had a better diet quality, as measured by USDA's Healthy Eating Index-2010 (all  $p < 0.01$ ). Dietary fiber intake was increased in both genders consuming pasta/cooked cereals/rice, ranging from 2.2-2.8 g more/day (all  $p < 0.01$ ) vs. no grains. Saturated and total fat were lower in females consuming breads/rolls vs. no grains ( $23 \pm 0.2$  vs.  $25 \pm 0.6$  and  $64 \pm 1$  vs.  $71 \pm 1$  g/day, respectively; all  $p < 0.01$ ). No significant differences were seen in total or added sugar intakes. Body mass index (BMI) Z-scores were lower in males consuming several grain patterns vs. no grains (all  $p < 0.01$ ). Children consuming several grain foods, including pasta/cereals/rice, crackers/salty snacks had a significantly lower risk of being overweight or obese vs. no grains (odds ratio (OR): 0.42; 95th confidence intervals (CI) 0.27, 0.66, OR: 0.60; CI: 0.41, 0.87, respectively; all  $p < 0.01$ ). **Conclusions:** Consuming certain grain patterns in children was associated with improved nutrient intakes and diet quality as compared to no grains. Additionally, relative to no grains, children consuming several grain foods had a reduced risk of being overweight or obese.

**T-P-3182****Contribution of body fat on serum 25-Hydroxyvitamin D concentration in Korean elderly : Analysis of the Fourth and Fifth Korea National Health and Nutrition Examination Survey (KNHAENS IV-2, 3, 2008-2009 and V-1, 2010)**

Nam-Seok Joo, Beomhee Choi *Seoul Korea*, Soo-Jung Park *Suwon Gyeonggi-do*

**Background:** There were several studies to evaluate the relation of serum 25-hydroxyvitamin D (25OHD) with body fat mass, but there is no large community-based study.

**Methods:** In a total of 29,235 subjects from the 2008-2010 Korean National Health and Nutrition Examination Survey (KNHANES), the relevant data of 6,458 subjects age over 50 years (3,164 male and 3,294 female) were selected and analyzed cross-sectionally. Serum 25OHD concentrations were compared by tertiles of body fat mass, trunk fat mass and limb fat mass measured by Dual-energy X-ray Absorptiometry (DXA) in tertiles of body weight.

**Results:** The mean serum 25OHD concentration was 20.2 ng/mL in men, 21.6 ng/mL in women and showed significantly negative correlation with body weight, body mass index, waist circumference, total body fat mass, trunk fat mass, and limb fat mass after age adjustment in both sexes. After dividing body weight into tertiles, serum 25OHD concentration showed significant decrease as their body fat mass tertiles increased in all three body weight tertiles in men, but not in women. Similar decreasing pattern of serum 25OHD concentration was also demonstrated in comparison of tertiles in trunk fat mass and limb fat mass in men.

**Conclusions:** Serum 25OHD concentration was highly correlated with total body fat mass as well as trunk fat mass and limb fat mass in Korean elderly men.

**T-P-3183****Dietary energy density and weight change in the Women's Health Initiative**

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Linda Snetselaar *Iowa City IA*, Lesley Tinker *Seattle WA*, Molly Waring *Worcester MA*, Cynthia Thomson *Tucson AZ*

**Background:** Obesity prevalence increased among older adults, especially women, from 2003-2012. While research suggests high dietary energy density (DED, kcal/gram) contributes to weight gain, this relationship has not been characterized in postmenopausal women.

**Methods:** Eligible women in the Women's Health Initiative's (WHI) Hormone Therapy and/or Calcium/Vitamin D Trials had  $\geq 4$  measured weights over 7 years ( $n = 15,351$ ). Nutrient and food weight estimates were obtained using WHI's food frequency questionnaire. DED included energy-containing beverages. The association between DED and body weight change was estimated using linear regression each follow-up year, with lowest DED quintile as the reference. Multivariate models were adjusted for factors changing age-adjusted estimates  $\geq 10\%$  (age, baseline weight, physical activity, history of cardiovascular disease, and adult weight change).

**Results:** Participants had a mean age of  $63.8 \pm 7.1$  years; 83.5% were non-Hispanic white. Women with lower baseline DED were more likely to report higher physical activity, lower and stable weight, higher fruit intake, and lower meat and fat consumption. After slight weight loss during follow-up year 1, women gained weight. Gain peaked in Year 4; women in DED quintiles 4 and 5 demonstrated the least gain (0.53kg and 0.76kg, respectively), quintiles 1 and 2 showed the greatest (1.18 kg and 0.86 kg). The inverse relationship between DED and weight gain was significant at each follow-up except year 7 ( $p < 0.001$  all trends).

**Conclusions:** Contrary to previous studies and our hypothesis, postmenopausal women with higher DED had lower weight gain over 7 years than those with lower DED.

**T-P-3184****Dietary intake patterns in normal and overweight/obese urban children with asthma**

Elissa Jelalian *Providence Rhode Island*, E. Whitney Evans *Providence Rhode Island*, Sheryl Kopel *Providence RI*, Daphne Koinis-Mitchell *Providence, RI RI*

**Background:** Asthma and obesity are the most common chronic diseases of childhood. The co-occurrence of each condition is disproportionately high among urban children. Epidemiological findings support that a diet rich in fruits, vegetables, and whole grains is associated with reduced asthma symptoms and supportive of weight control. This study examined associations among dietary intake, asthma indicators, ethnicity and weight status in a sample of urban children with asthma.

**Methods:** Urban school children with asthma (aged 7 to 10) were recruited as part of a larger study focused on asthma, physical activity, and diet. Asthma indicators (proportion of days with symptoms and the Asthma Control Test) were assessed by home spirometry and a daily diary over a monitoring period. Dietary intake was assessed using the Block Food Screener for Kids, which estimates usual daily fruit, vegetable, whole grain, dairy, meat/fish/poultry, and added sugar intake.

**Results:** On average, 48% participants were overweight/obese, 54% were Hispanic, 32% were African American, and 74% of families were at or below the federal poverty threshold. Neither asthma symptoms nor asthma control were related to dietary intake. Black children consumed significantly more

whole grains as compared to Hispanic and white children (0.81 vs. 0.34 and 0.48 ounces). Intake of fruits, vegetables, whole grains, meat/fish/poultry, dairy, or added sugar did not significantly differ between normal and overweight/obese children in this sample. However, both groups consumed less than the recommended daily servings of vegetables (.42-.55 vs. 2 cups), whole grains (.46-.56 vs. 2.5 ounces), and meat/fish/poultry (2.6-2.9 vs. 5 ounces).

**Conclusions:** Whereas dietary intake patterns did not differ between normal weight and overweight/obese urban children with asthma in this sample, both groups reported intakes well below national recommendations. Urban children with asthma, independent of weight status, would benefit from interventions to improve diet quality.

#### T-P-3185-DT

##### Dietary Practices of Children in a Weight Management Clinic

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**Background:** Dietary practices are important contributors to weight and health status in children. The objective of the present study was to examine the association between dietary practices and body composition in children seeking treatment of obesity.

**Methods:** Caregivers of 119 children (age  $12.7 \pm 3.6$  years, BMI-z  $2.53 \pm 0.51$ , 59% female, 71% African American) who were enrolled in a multidisciplinary outpatient weight management clinic completed questionnaires that assessed their child's dietary practices during the preceding 7 days, and assessment of each child's anthropometric measurements and body composition by bioelectrical impedance analysis were obtained at the baseline visit. ANCOVAs included age, sex, race, and BMI-Z as covariates.

**Results:** Children of African American race had significantly higher parent-reported fruit juice consumption ( $p < 0.0001$ ) and higher frequency of skipping lunch ( $p = 0.007$ ) compared to subjects of other races. Boys had higher parent-reported soda consumption compared to girls ( $p = 0.028$ ). No significant associations were observed between parent-reported dietary practices and BMI-Z, waist circumference-Z, or percent body fat.

**Conclusions:** Based on parent report, racial differences in fruit juice consumption and meal skipping as well as sex differences in soda consumption were observed in our cohort, but dietary practices were not associated with measures of body composition. Self-reported questionnaires completed by adolescents are currently being analyzed for comparison with parent responses and in association with adiposity.

#### T-P-3186

##### Does Labeling Spoodles in a College Dining Hall Impact Food Selection Patterns?

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**Background:** Consuming larger portion sizes of foods outside of the home is a contributor to increasing obesity rates. This study tested whether labelling a food-serving utensil (a

spoodle) with appropriate portion size information for two frequently consumed foods (mashed potatoes and penne pasta) influenced food selection patterns in college students.

**Methods:** An ABBA reversal design was used in a large campus dining hall over a period of six weeks. During baseline and reversal periods, no portion size signage was displayed. During intervention weeks, an informational sign regarding the spoodle and the appropriate serving size of the target food was placed directly above the corresponding food stations. University Dining Services provided data each week regarding the number of students entering the dining hall and the number of pans of each target food served between 4:15pm and 7:15 pm.

**Results:** Results suggest that the spoodle labeling had no impact on food selection patterns. Similar amounts of penne pasta and mashed potatoes were self-served by students during baseline and intervention weeks. Exit surveys conducted in the dining halls indicated that 86.8% of students did not notice the spoodle sign despite their prominent display and as a result, the majority of the students (94.7%) said the intervention did not influence their portion size.

**Conclusions:** Labeling food utensils in a college dining hall had no impact on food selection of two commonly consumed high calorie foods. Further research should explore the impact of portion size signage on food consumption in more carefully monitored settings and increase signage visibility to potentially maximize intervention effects.

#### T-P-3187

##### Ecological Momentary Assessment of Weight-Related Parenting Practices: Associations with Retrospective Measures and Children's BMI

Eleanor Tate Shonkoff *Los Angeles CA*, Yue Liao *Los Angeles California*, Genevieve Dunton *Los Angeles CA*

**Background:** Retrospective measures of weight-related parenting practices have been linked to child obesity-related behaviors and risk. However, not all studies find evidence of a link. One limitation may be the retrospective nature of the measurements. Yet very little research has validated real-time measures of parenting behavior. This study examined the validity of ecological momentary assessment (EMA) measures of weight-related parenting practices and their agreement with retrospective indices.

**Methods:** Mother-child dyads from a larger trial of 200 was included in this preliminary analysis ( $n = 59$  dyads). One-item EMA measures assessed parenting practices of limiting: (a) TV/video game time, and (b) high-calorie, low nutrient food (HCLN) intake. Retrospective measures of the same parenting practices used items from two validated instruments (Child Feeding Questionnaire; Parenting Strategies for Eating and Activity Scale). Person-level means were calculated from EMA measures. Correlations assessed agreement between EMA and retrospective measures.

**Results:** The sample of mothers was 41 years old ( $SD = 5.9$ ), married (69%), and many had graduated college (46%). The child sample was balanced by gender, 11 years old ( $SD = .60$ ), 37% Hispanic, and healthy weight (BMI pctl.  $M = 54$ th;  $SD = 33$ ). Mothers were with children on 78% of answered prompts. Person-level means of EMA-reported parenting practices were not significantly correlated with retrospective measures for either parenting practice. However, parents who limited HCLN more frequently, according to EMA reports, had children with lower BMI percentiles ( $r = -.41$ ,  $p = .04$ ).

**Conclusions:** Mother's overall view of their weight-related

parenting strategies may not reflect what they actually do during a typical week. However, these preliminary results may differ from those on the total sample. Future research is needed to determine when and under what circumstances weight-related parenting behavior deviates from retrospective measures.

**T-P-3188-DT****Examination of Two Dietary Quality Indices in Low Income Preschool and Adolescent Children from Four US Cities**

Kimberly Truesdale *Chapel Hill North Carolina*, Donna Matheson *Stanford CA*, Charlotte Pratt *Bethesda MD*, Meghan JaKa *Minneapolis Minnesota*, Sarah McAleer *Cleveland Ohio*, Evan Sommer *Nashville Tennessee*, June Stevens *Chapel Hill North Carolina*

**Background:** The Healthy Eating Index (HEI) is a measure of overall diet quality and the mean score in NHANES children is ~50. However, HEI may overestimate diet quality because positive points are given for intake of some less healthy foods (e.g. fried and starchy vegetables, whole grains from desserts or savory snacks, dairy desserts). Our objectives were to create and apply a modified HEI (mHEI) that better captures a healthy diet by excluding selected less healthy food items and to compare mHEI to HEI. We hypothesized that children would have lower scores for the fruit, vegetables and empty calories mHEI components.

**Methods:** The Childhood Obesity Prevention and Treatment Research (COPTR) Consortium children are low income from 4 sites – Minneapolis, MN (n=534 2-4 yr olds ≥50th BMI %tile), Nashville, TN (n=610 3-5 yr olds 50th-95th BMI %tile), Cleveland, OH (n=360 10-13 yr olds ≥85th BMI %tile), and the Bay Area, CA (n=241 7-11 yr olds ≥85th BMI %tile). Two or three 24-hour dietary recalls per child were used to calculate average HEI and mHEI scores. The mHEI changed items included for 8 of the 12 HEI components. For each site, we estimated the mean overall and component HEI and mHEI scores. Differences were compared using paired t-tests.

**Results:** Mean (SD) HEI score was 64.1 (11.6) in Minneapolis, 64.8 (11.5) in Nashville, 48.0 (10.9) in Cleveland and 62.2 (11.4) in the Bay Area. Only 0.3 to 9.9% of children scored ≥80 (high diet quality). Across all sites, the mHEI scores were 9-10 points lower and fewer children (0-1.9%) scored ≥80. The primary differences were lower scores for whole grains (2-4 points) and empty calories (4 points). Small (0.4-1.2 points) but statistically significant (p<0.05) differences were found for total vegetables and fatty acid ratio.

**Conclusions:** Both indices show a small percentage of low income children consumed a healthy diet. The eliminated unhealthy food items accounted for 14-18% (9-10 points) of the HEI scores. Thus, the mHEI may better indicate a healthy diet.

**T-P-3189****Examining the relationship between fruit and vegetable intake, perceived access, and body mass index.**

Lindsey Haynes-Maslow *Washington DC*, Lucia Leone *Buffalo New York*, Gina Tripicchio *Chapel Hill North Carolina*, Jared McGuirt *Chapel Hill North Carolina*

**Background:** There have been mixed research findings on the association between fruit and vegetable intake and body mass index (BMI), as well as perceived access to fruit and

vegetables and BMI. The purpose of this study is to examine the relationship between self-reported fruit and vegetable intake and perceived access to fruit and vegetables on adult BMI.

**Methods:** Data from the Green Cart Study's was used. The Green Cart study examines usage and outcomes associated with mobile produce markets in lower-income communities. Participants completed a telephone-administered survey with questions on fruit and vegetable intake, perceived access to fruit and vegetables, demographics, and home address. Linear regression models were used to determine the effect of fruit and vegetable intake and perceived access to fresh fruit and vegetable on BMI. Gender, race/ethnicity, education, income, household size, food assistance benefits, and the number of convenience/grocery stores within 1-mile of participants' homes were controlled for.

**Results:** Among 170 participants, each additional F&V serving per day was associated with a 0.85 unit decrease in BMI (p<.01). Having lower perceived access to fresh F&V within the community was associated with increased BMI (p<.05). Each additional grocery store within 1 mile of a participant's home was associated with a 0.69 unit decrease in BMI (p<.10). Racial/ethnic weight disparities were also found (p<0.05).

**Conclusions:** Fruit and vegetable intake is negatively correlated with BMI. Having lower perceived access to fruit and vegetable intake is positively correlated with BMI. Additionally, the number of grocery stores within an individual's community is negatively associated with BMI. This research supports the need for obesity prevention efforts and policy to focus on increasing access to and intake of fruit and vegetables in lower-income communities.

**T-P-3190****Examining Traditional and Internet-Based Resources for Home Cooking Information: an Association Rule Learning Approach**

Allison Doub *State College Pennsylvania*, Meg Small *University Park PA*, Aron Levin *Highland Hts KY*, Kristie LeVangie *Cincinnati OH - Ohio*, Timothy R. Brick *University Park PA*

**Background:** Cooking at home is one obesity prevention recommendation. Research is needed on where individuals seek home cooking information (e.g., recipes) so that interventions can strategically target these resources based on their prevalence of use and user characteristics.

**Methods:** 583 diverse adult online survey participants who were >50% responsible for meal planning reported their demographic information, average number of meals prepared at home / week, and whether they got meal ideas from 4 traditional and 7 Internet-based resources. Descriptive statistics were calculated and independent samples t-tests compared meals prepared at home by resource use. Association rule learning explored whether demographics were associated with resource use.

**Results:** Participants prepared 8.7 meals at home per week (SD = 5.1). Traditional meal idea resources were: family and friends (71%), cookbooks (41%), grocery store handouts (33%), and coupon books (32%). Internet-based resources were: food community websites (45%), company branded websites (34%), Facebook (33%), food-related apps (33%), food blogs (30%), Pinterest (25%) and special nutrition interest websites (14%). Cookbook users prepared more meals at home (M = 9.2, SD = 5.3) than non-cookbook users (M = 8.5, SD =

5.0;  $p < .001$ ). Compared to all participants, 18 to 34 year old parents of children  $< 18$  years were 1.6 times more likely to use Facebook (sup. = 7.6%, conf. = 55%,  $p < .001$ ) and 1.7 times more likely to use food-related apps (sup. = 7.2%, conf. = 53%,  $p = .01$ ). Parents whose household incomes were  $> 75k$  were 1.6 times more likely to use food-related apps (sup. = 8.9%, conf. = 51%,  $p < .01$ ).

**Conclusions:** Family and friends, food community websites, and cookbooks were the most common meal idea resources. Young and/or wealthy parents were more likely to use Facebook and food-related apps. Future research should examine whether these and other home cooking resources (e.g., YouTube, magazines) provide information that promotes or protects against obesity.

#### T-P-3191

##### Facebook and Food Posts

Laura Barre *Ithaca NY*, Abaigeal Thompson *Austin Tx*, Kaylie Cronin *Tewksbury MA*

**Background:** Social networking sites contribute to the obesogenic environment by exposing us to images and text about food. This study aimed to characterize food-related communications viewed on Facebook and to explore the association of viewing these posts with eating and BMI.

**Methods:** We conducted a cross sectional study of college students that were active Facebook users. Participants completed online surveys using their Facebook accounts to answer questions about Facebook usage, food-related posts viewed in 12 hours, and perceived impact of Facebook posts on eating. Food intake was assessed with the REAP survey. Correlation coefficients were used to explore the association of food posts with foods consumed and BMI.

**Results:** Fifty participants completed the survey, of which 66% were female and 61.7% white. Mean age was 20.5 years (S.D. = 1.2) and median BMI 22.1 kg/m<sup>2</sup>. More than half of participants viewed  $> 100$  posts in 12 hours. Of the posts viewed, 4.5% were food-related, with a mean of 6.1 (S.D. = 4.7) food-related posts seen in 12 hours. Food-related posts were primarily pictures (59.8%), text (23.3%), and advertisements (15.2%). Participants described 50% of food-related posts as unhealthy and 70% agreed that seeing food-related posts could cause food cravings. The percentage of posts that were food-related positively correlated with BMI but was not significant ( $r=0.281$ ,  $p=0.056$ ). The absolute number of food related posts associated with consumption of sweets, sodas, and snack chips ( $r=0.29$ ,  $p=0.045$ ). Food related posts were reported to affect eating by 31.9% of participants.

**Conclusions:** Approximately 1 in 20 posts viewed on Facebook by college students is food-related with half of these perceived as unhealthy. Food-related posts caused cravings for many and associated with eating more calorie-dense nutrient-poor foods. Due to the small number of participants in the obese BMI range, further exploration is needed to investigate the obesogenic influence of social media on food and eating behaviors.

#### T-P-3192

##### Fatter After Four Years: Examining the Weight Trajectory of College Students

Lizzy Pope *Burlington Vermont*, Danielle Hansen *Burlington VT*, Lucy Mower *Burlington Vermont*, Jean Harvey *Burlington VT*

**Background:** Much attention has been paid to the amount of weight college students gain during their first-year, but the remainder of college has largely been ignored. This study examined the weight trajectory of students over all four years of college.

**Methods:** 117 students were enrolled in this descriptive study. Students had their height and weight assessed during September and April of their first-year in 2011-2012, and during the final month of their senior year in spring 2015. Body Mass Index (BMI) was calculated from measured heights(cm) and weights(kg).

**Results:** 86 students remained in the study for four years. There was a significant increase in BMI from the beginning of freshman year ( $M=23.54+4.00$ ) to the end of freshman year ( $M=24.02+3.96$ ),  $p<0.001$ . BMI was significantly higher at the end of senior year ( $M=24.84+4.46$ ) versus the beginning of freshman year ( $M=23.59+4.01$ ),  $p<0.001$ , or end of freshman year ( $M=23.98+3.93$ ),  $p<0.001$ . Mean weight gain over freshman year was 1.44kg, which was significant,  $p<0.001$ . Weight was also significantly higher at the end of senior year ( $M=71.32+15.60$ ) versus the beginning of freshman year ( $M=66.94+14.02$ ),  $p<0.001$  or the end of freshman year ( $M=68.26+13.74$ ),  $p<0.001$ . Students' mean weight gain was 4.38kg over four years. 20 students were classified as overweight (BMI $>25$ ) and 8 students as obese (BMI $>30$ ) during freshman year. The number of obese students remained at 8 during senior year, but the number of overweight students increased to 27.

**Conclusions:** Although students did gain weight over freshman year, they did not gain close to the "freshman 15." However, it appears that students continue to gain weight over their four years in college, and more students move into the overweight BMI category. This pattern might be the beginning of the small yearly weight gains possibly responsible for the increased prevalence of overweight/obesity in the U.S.

#### T-P-3193

##### Grain Food Sources of Energy and Nutrients Among Children in the United States: Data from the National Health and Nutrition Examination Survey, 2009-2012

Yanni Papanikolaou *Paris ON*, Victor Fulgoni *Battle creek MI*

**Background:** Data on grain food sources of energy and nutrients in children are lacking. The purpose of this study was to determine food sources of energy and nutrients for US children using data from the National Health and Nutrition Examination Survey, 2009-2012.

**Methods:** Analyses of grain food sources were conducted using a 24-hour recall in children 2-18 years of age ( $n=6,109$ ). Sources of nutrients contained in grain foods were determined using USDA nutrient composition databases and food grouping scheme for grains (excluding mixed dishes). Mean energy and nutrient intakes from the total diet and from various grain food groups were adjusted for the sample design using appropriate weights.

**Results:** All grains provided  $263\pm 5$  kcal/d or  $14\pm 0.2\%$  kcal/d in the total diet in children. In the total daily diet, grains contributed  $7.6\pm 0.2\%$  ( $4.9\pm 0.2$  g/d) total fat,  $5.4\pm 0.2\%$  ( $1.2\pm 0.04$  g/d) saturated fat,  $15.9\pm 0.2\%$  ( $454\pm 9$  mg/d) sodium,  $8\pm 0.2\%$  ( $9\pm 0.2$  g/d) total sugar,  $22.5\pm 0.3\%$  ( $3\pm 0.1$  g/d) dietary fiber,  $12.7\pm 0.3\%$  ( $124\pm 2$  mg/d) calcium,  $39.3\pm 0.5\%$  ( $238\pm 7$  DFE/d) folate,  $34.9\pm 0.5\%$  ( $5.6\pm 0.1$  mg/d) iron, and  $13.7\pm 0.2\%$  ( $33.3\pm 0.8$  mg/d) magnesium. Breads, rolls and tortilla grains collectively provided  $122\pm 4$  kcal/d or  $6.4\pm 0.2\%$  kcal/d,  $3.1\pm 0.1\%$  ( $2.1\pm 0.1$  g/d) total fat,  $2.2\pm 0.1\%$  ( $0.5\pm 0.02$  g/d)

saturated fat,  $7.4 \pm 0.2\%$  ( $217 \pm 6.5$  mg/d) sodium,  $2.1 \pm 0.1\%$  ( $2.1 \pm 0.07$  g/d) total sugar,  $11 \pm 0.3\%$  ( $1.5 \pm 0.05$  g/d) dietary fiber,  $6.7 \pm 0.2\%$  ( $64 \pm 2$  mg/d) calcium,  $13.6 \pm 0.5\%$  ( $63 \pm 2$  DFE/d) folate,  $11 \pm 0.3\%$  ( $1.5 \pm 0.04$  mg/d) iron, and  $6.4 \pm 0.2\%$  ( $15.5 \pm 0.5$  mg/d) magnesium.

**Conclusions:** A variety of grain foods contribute to total diet nutrient density in US children and have the potential to increase consumption of underconsumed nutrients.

#### T-P-3194

##### High dietary choline and betaine intakes are associated with better body composition in the Newfoundland population

Xiang Gao *St. John's Newfoundland and Labrador*, Edward Randell *St. John's NL*, Wayne Gulliver *St. John's NL*, Yongbo Wang *ST. JOHN'S Newfoundland*, Yanqing Yi *St. John's Newfoundland*, Guang Sun *St. John's Newfoundland and Labrador*

**Background:** Studies suggested dietary choline and betaine may improve body composition in animals, but little data is available from humans. We studied the association of dietary choline and betaine intakes with body composition in the Newfoundland population.

**Methods:** A total of 3214 subjects from the CODING (Complex Diseases in the Newfoundland Population: Environment and Genetics) study were assessed. Dietary choline and betaine intakes were computed from the Willett Food Frequency Questionnaire. Body composition was measured using dual-energy X-ray absorptiometry. Age, physical activity level and total calorie intake were controlled in all analyses.

**Results:** Significant negative correlations were found between dietary choline, betaine intakes and total percent body fat (%BF), percent trunk fat (%TF), percent android fat (%AF) and percent gynoid fat (%GF) in both men and women (r:  $-0.29$  to  $-0.38$  for choline and  $-0.15$  to  $-0.26$  for betaine;  $p < 0.001$ ). Significant positive correlations were observed with total percent lean mass (%LM) in both sexes (r:  $0.33$  to  $0.38$  for choline and  $0.22$  to  $0.25$  for betaine;  $p < 0.001$ ). Dietary choline and betaine intakes were the lowest in obese, intermediate in overweight and the highest in normal weight subjects. The intakes of choline and betaine in obese men and women were significantly less than normal weight subjects ( $-44\%$ ,  $-36\%$  for choline and  $-47\%$ ,  $-36\%$  for betaine respectively,  $p < 0.001$ ). The significant negative correlations were found in all other obesity measures: %TF, %AF, %GF, %BF, and positive correlation with %LM between high and low dietary choline or betaine intake groups ( $p < 0.001$  for all variables).

**Conclusions:** We discovered that higher dietary choline and betaine intake are associated with a significantly favorable body composition profile. The association was stronger in dietary choline intake than betaine.

#### T-P-3195

##### High dietary choline and betaine intakes are associated with low insulin resistance in the Newfoundland population

Xiang Gao *St. John's Newfoundland and Labrador*, Guang Sun *St. John's Newfoundland and Labrador*

**Background:** Reports on the association between choline and betaine intakes insulin resistance (IR) were mainly from animals and data was contradictory. Evidence from humans is scarce. We investigated the association between dietary

choline and betaine intakes and IR in a large population based study.

**Methods:** A total of 2539 subjects from the CODING study were assessed. Dietary choline and betaine intake was evaluated from the Willett Food Frequency Questionnaire. Body composition was measured using dual-energy X-ray absorptiometry. Age, physical activity level and total calorie intake were adjusted in all analyses.

**Results:** Subjects with the highest intakes of dietary choline and betaine had the lowest levels of fasting insulin and IR defined by both the Homeostasis Model Assessment (HOMA-IR) and Quantitative Insulin-sensitivity Check Index (QUICKI) ( $p < 0.001$  for choline intake in both genders and betaine intake in women,  $p < 0.01$  for betaine intake in men). Analysis of covariance showed that choline or betaine intakes in high IR group were  $-25\%$  and  $-24\%$  lower than low IR group ( $p < 0.001$ ) in women and  $-31\%$  ( $p = 0.01$ ),  $-20\%$  ( $p = -0.218$ ) in men. Partial correlation analysis showed dietary choline and betaine intakes were significantly inversely correlated to circulating insulin (r:  $-0.17$ ,  $-0.14$  for choline,  $-0.13$ ,  $-0.11$  for betaine in women and men;  $p < 0.001$ ), HOMA-IR (r:  $-0.17$ ,  $-0.14$  for choline,  $-0.14$ ,  $-0.09$  for betaine in women and men;  $p < 0.001$ ), and positively related to QUICKI (r:  $0.16$ ,  $0.16$  for choline,  $0.12$ ,  $0.11$  for betaine in women and men;  $p < 0.001$ ).

**Conclusions:** Higher dietary choline and betaine intakes are strongly associated with attenuated insulin resistance at population level. The association was stronger in women than men.

#### T-P-3196-DT

##### Household and Individual-level Determinants of Fruit and Vegetable Intake among Low-Income Urban African American Adolescents

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**Background:** Childhood obesity, one of the greatest challenges to public health, disproportionately affects low-income urban minority populations. Fruits and vegetables (FV) are nutrient dense foods that may be inversely associated with weight gain. We aimed to identify individual and household factors influencing FV consumption in African-American (AA) youth in Baltimore, MD.

**Methods:** This is a cross-sectional analysis of data collected from 299 low-income AA caregiver-child (age range: 10-14 y) dyads participating in the baseline evaluation of the B'More Healthy Communities for Kids obesity prevention trial. The Kids Block Food Frequency Questionnaire was used to estimate daily intakes of FV and dietary fiber. Questionnaires were used to assess socio-demographics, food purchasing and preparation behavior, and psychosocial information. Ordered logit regression analyses investigated psychosocial and food-related behavior determinants of FV and dietary fiber intake (quartile of intake) controlling for confounders.

**Results:** On average, children consumed  $1.5 \pm 1.1$  (M+SD) servings of fruit and  $1.8 \pm 1.7$  of vegetable/day. There were no differences by gender, age or household income. Intentions about food were positively associated with vegetable intake and higher self-efficacy associated with increase in fiber intake (OR 1.2; 95% CI 1.1-1.3 and 1.1; 1.01-1.1). Children receiving free/low cost breakfast or lunch at school had increased odds for fruit and fiber intake (OR 2.4; 1.2-4.7; OR 2.1; 1.1-4.3, respectively). Children with parents who shopped very frequently ( $>5$  trips/mo) at fast-food stores had 46% lower

odds for vegetable intake (95%CI 0.29-0.97). Receiving SNAP was associated with 85% increased odds for vegetable intake.

**Conclusions:** In our study both individual and household factors were associated with child FV intakes, underscoring the need for a multi-level approach in increasing FV intakes. These results will inform and shape an effective intervention program for improving child dietary intakes.

#### T-P-3197

##### Identifying Candidate Genes of Food Addiction by Exome Sequencing

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**Background:** We have shown that food addiction (FA) is a distinguished clinical feature affecting about 5% of the general adult population. However the genetic variants and underlying genes in FA are unknown. The aim of the current study is to screen potential candidate genes that might be related to FA.

**Methods:** From a total of 737 adults recruited from the CODING study, whole exome sequencing was performed on 30 subjects including 10 obese with high and 10 obese with low/zero FA symptoms (FAO, NFO), and 10 controls with normal weight and low/zero FA symptoms (NFH). FA symptom count was assessed using the Yale Food Addiction Scale. The top 35 SNPs with the most significant differences among the 3 groups were evaluated.

**Results:** FAO versus NFH showed that 5 SNPs were associated with 4 addiction (Ad) related genes (GPSM1, NRK, ZCCHC14, NTM), 4 SNPs were associated with 4 psychological disorders (Psd) related genes (DOCK9, GMIP, MCTP1, SYN3) and 5 SNPs were associated with 5 genes related to energy metabolism and obesity or obesity related diseases (ORD). The comparison between FAO and NFO revealed 1 SNP associated with an Ad gene (TIRAP), 5 SNPs associated with 3 Psd genes (PCM1, SYNE1, AMPD3) and 8 SNPs associated with 7 genes related to ORD. The comparison of the group with high FA symptoms (FAO) and the combined group of NFO+NFH revealed 4 SNPs associated with 4 Ad genes (ZCCHC14, NTM, ALK, INFAR1), no SNP related to Psd genes, and 8 SNPs associated with 8 genes related to ORD. All the aforementioned SNPs had significantly higher minor allele frequencies (F) in FAO. The comparison of the SNPs between NFO and NFH showed 31 SNPs including 1 SNP associated with an Ad gene with a higher F in NFH group, and 6 SNPs associated with 6 ORD genes (frequency in 4 SNPs was higher and in 2 SNPs was lower in NFO).

**Conclusions:** For the first time we revealed a panel of candidate genes that might be related to food addiction in humans.

#### T-P-3198-DT

##### Including Fruit Juice Concentrate as an Added Sugar Substantially Changes Estimates of Added Sugar Content of Products and Purchases: A Case Study of Sweetened Beverages in 2007-2008

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**Background:** There has been increasing attention to added sugar consumption, including the FDA proposed rule to require its labeling on the nutrition facts panel (NFP) of

consumer package goods (CPGs). However, the primary US databases to estimate added sugar consumption have not kept up with the rapidly changing supply of CPGs, and have not included fruit juice concentrate (FJC), an important caloric sweetener which was included in the FDA proposal.

**Methods:** This analysis uses the 2007-08 Nielsen Homescan Consumer Purchase data on US household CPG purchasing, plus NFP and ingredient data from a number of sources. A linear programming model was applied to a subset of beverages for which robust estimates were produced (n=11,635). Presence and amounts of added sugars among UPCs, and purchasing by households were analyzed.

**Results:** Of the sweetened beverages examined in 2007-08, 14% contained FJC. The presence and amount of sweeteners varied widely by category, from 18-76 kcal/100g of product not including FJC in the added sugar definition, and 18-91 kcal/100g including FJC. Households in 2007-8 purchased an adjusted average of 23585 kcal/capita/year in added sugars, with 2081 kcal/capita/year from FJC. Households with kids purchased 2489 kcal/capita/year from FJC alone. Lower income and NH White households purchased significantly more kcal from FJC.

**Conclusions:** This study uses sweetened beverages to demonstrate that omitting FJC from the definition of added sugars for NFPs would omit a nutritionally significant amount of beverage calories purchased in the US. FJC deserves increased attention from the public health community given the adverse cardiometabolic impacts of added sugars particularly from beverages.

#### T-P-3199

##### Increased Caloric Intake Mediates the Relationship Between Screen Time and Body Mass Index in Overweight/Obese Adolescents Primarily by Increased Carbohydrate Intake: The HEARTY Trial

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**Background:** Sedentary behavior is associated with increased risk of cardiovascular disease, diabetes, and obesity.

Adolescents spend a large proportion of sedentary time in front of screens and the impact these behaviors have on body mass index (BMI) and energy intake (EI) is unclear. This study examined whether the relationship between screen time (ST) and BMI was mediated by total EI (model 1) and macronutrient intake (model 2).

**Methods:** A cross-sectional study of post-pubertal overweight or obese adolescents (N=283) at baseline of an intervention for weight control. Total EI (mean kcal and macronutrients from 3 day food diary) and sedentary behavior (hours spent in ST: watching TV, recreational computer use, playing seated video games, and total ST) were measured with self-report, and BMI was objectively measured in the laboratory. Simple (model 1) and multiple (model 2) mediation analyses were conducted using the bootstrapping approach, with 5,000 samples with replacement (Preacher & Hayes, 2008). Covariates included age, gender, race, parent education, tanner stage, and physical activity.

**Results:** For model 1, the total indirect effect of ST on zBMI was significantly mediated by EI,  $F(9, 273)=9.32$ ,  $p<.0001$ ,  $R^2=.24$ , adjusted  $R^2=.21$ . For model 2, increased carbohydrate intake significantly mediated the relationship between ST and

zBMI (95% BCa CI [0.0004, 0.0074]), whereas fat and protein did not.).

**Conclusions:** The relationship between ST and BMI appears to be mediated by increased EI, primarily by increased carbohydrate intake. Future research is needed to determine if reducing ST reduces carbohydrate intake and BMI in overweight and obese youth.

#### T-P-3200

##### Individual Differences in Reported Frequency of Highly Processed Food Consumption

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**Background:** Recent research has demonstrated that highly processed foods, containing added fat and refined carbohydrates (like white flour and sugar), are most associated with behavioral indicators of addictive-like eating. However, no previous studies have examined whether individual differences, such as “food addiction” symptomology, body mass index (BMI), or gender, are related to how frequently highly processed foods are reported to be consumed.

**Methods:** Participants (n= 160) recruited through Amazon MTurk reported how frequently they consumed twenty-nine common highly processed foods (e.g., chocolate, pizza, French fries) in a typical week. Individuals also completed the Yale Food Addiction Scale (YFAS) to assess symptoms of “food addiction” and provided self-reported height and weight and gender. Multivariable linear regression was used to examine the unique association of YFAS symptomology, BMI, and gender with reported frequency of highly processed food consumption.

**Results:** Participants (52% female) varied in age (M= 37.4, SD= 13.3), BMI (M= 26.9, SD= 7.5), and YFAS symptom score (M= 2.2, SD= 1.8). YFAS symptomology was positively correlated with the frequency of highly processed food consumption ( $\beta = 5.74$ ,  $t(156) = 6.67$ ,  $p < .001$ ). BMI was not related to frequency of highly processed food consumption ( $\beta = -0.051$ ,  $t(156) = -0.225$ ,  $p < .799$ ). No gender differences were found ( $\beta = -5.197$ ,  $t(156) = -1.750$ ,  $p < .082$ ).

**Conclusions:** Elevated symptoms of “food addiction” were associated with more frequent reported consumption of highly processed foods. Notably, BMI was not a predictor for how frequently these foods were reported to be consumed. These findings provide further support for the idea that highly processed foods may be closely implicated in an addictive-like eating process for some individuals.

#### T-P-3201

##### Lunchbox Lessons: Parent Lunch Packing, Child Lunch Eating and Child Weight

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**Background:** Early care and education settings where children bring sack lunch present unique opportunity to examine bi-directional influences of parenting, child eating, and child weight. Study hypotheses are, compared to their non-overweight peers, overweight or obese (OW) preschool children (a) had parents who packed more servings of food in

the sack lunches and/or (b) the children ate larger proportions of the available food.

**Methods:** This study was secondary analyses of data from the efficacy trial of an intervention to increase parents' packing of fruit, vegetables, and whole grains in their preschool children's sack lunches. Of the 584 parent-child dyads with child Body Mass Index measured, 132 were OW. Direct observations of servings packed and consumed for two randomly selected week day lunches at four times (baseline, 6-, 22-, 28-week follow-ups) were analyzed in separate multi-level models for fruit, vegetables, grains, dairy, protein, chips, sweets comparing OW to peers.

**Results:** On average at each time, the packed lunches contained  $>2.1$  servings grain;  $>1.0$  servings each of fruit, protein, sweets;  $>0.6$  servings dairy;  $>0.2$  servings each of chips, vegetables. Children on average at each time consumed  $>1.3$  servings grain;  $>0.6$  servings each of fruit, protein, sweets;  $>0.4$  servings dairy;  $>0.1$  servings each of chips, vegetables. OW children had parents who packed more protein (differences 0.3 to 0.4 servings,  $P < .05$ ). Irrespective of servings packed and child weight, the children at each time consumed approximately the same proportion of the available food by type resulting in OW children eating more protein servings than their peers (differences 0.2 to 0.3 servings,  $P < .05$ ).

**Conclusions:** To help young children achieve and maintain healthy weight, interventions should focus on convincing parents they need not offer surfeits of protein and sweets to assure their preschool-aged children get enough to eat.

#### T-P-3202

##### Maternal Nutrition Knowledge is Inversely Related to Both Maternal and Child Weight Status

Haley Schlechter *State College Pennsylvania*, Catherine Shehan *Hartford CT*, Kathleen Keller *University Park PA*

**Background:** Previous studies have shown that nutrition knowledge impacts diet quality even after controlling for individual differences in socioeconomic status. However, the relationship between nutrition knowledge and body weight is less well known. This laboratory-based study was designed to characterize the relationship between children's liking and intake of common meal items. As a secondary aim we hypothesized that higher maternal nutrition knowledge would be negatively associated with both maternal and child weight status.

**Methods:** The current analyses are part of a cross-sectional study that took place over two laboratory visits. On the first visit, mothers who reported being primarily in charge of feeding (n=45) completed two 70 question quizzes testing their knowledge of various nutrition concepts ranging in difficulty. Child height and weight were measured and recorded on the first visit. Maternal height and weight were self-reported and converted to body mass index (BMI). Data were analyzed using Pearson's bivariate correlations and linear regressions.

**Results:** Mothers' score on the first nutrition knowledge survey were unrelated to maternal BMI ( $r = .25$ ,  $p = .10$ ) and child BMI z-score ( $r = .15$ ,  $p = .28$ ). However, on the second more challenging survey maternal nutrition knowledge was negatively related to both maternal BMI ( $r = -.39$ ,  $p = .02$ ) and child BMI z-score ( $r = -0.34$ ,  $p = .02$ ). After controlling for income, the relationship between maternal nutrition knowledge and maternal weight status remained significant ( $p = 0.03$ ), but the relationship between maternal nutrition knowledge and child weight status was no longer significant ( $p = 0.09$ ).

**Conclusions:** These results indicate that higher levels of maternal nutrition knowledge may be related to lower levels of maternal and child obesity. Additional research is needed to determine if teaching parents nutrition-based knowledge will help prevent the development of obesity.

#### T-P-3203-DT

##### **Meat and Sugar in the Costa Rican Diet: Can the Nutrition Transition Explain Socioeconomic Variation in Obesity?**

Traci Bekelman *Denver Colorado*, Darna Dufour *Boulder Colorado*, Carolina Santamaria-Ulloa *San Pedro San Jose*, Lilliam Marin-Arias *Montes de Oca San José*

**Background:** The rising prevalence of obesity among the urban poor in Latin America in unexplained due to limited data on dietary intake and physical activity in this population. While national level increases in the availability of sugar-sweetened beverages and animal source foods described in the Nutrition Transition model are occurring in tandem with rising obesity, few studies have evaluated the diet of individual women or how diet varies by socioeconomic status (SES). This study investigates how Body Mass Index (BMI), body composition and diet vary between women of low- and high-SES and identifies the types of dietary practices associated with energy intake.

**Methods:** Data were collected from a random sample of 140 non-pregnant, non-lactating mothers age 25 to 45 years in urban Costa Rica between June 2014 and February 2015. SES was defined using an index including education level, occupation, household conditions and neighborhood of residence. Anthropometry was used to assess BMI and body composition. Three 24-hour dietary recalls were used to assess energy intake and intake of sugar-sweetened beverages and animal source foods.

**Results:** Low-SES women had a higher mean BMI than high-SES women (29.6 vs. 27.0 kg/m<sup>2</sup>, p=0.04) and a higher obesity prevalence (38.0 vs. 18.0%, p=0.03). However, low- and high-SES women consumed sugar-sweetened beverages with similar frequency (2.4 vs. 2.1 times/day, p=0.1). Low- and high-SES women also consumed animal source foods with similar frequency (3.0 vs. 3.7 times/day, p=0.4).

**Conclusions:** The absence of variation in sugar-sweetened beverage and animal source food intake between low- and high-SES women was unexpected given the larger body size of low-SES women.

#### T-P-3204

##### **Morbid Obesity in Taiwan, a Health Inequality**

##### **Phenomenon: Trends and Associated Socio-Demographics and Lifestyle Factors**

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**Background:** Obesity is one of the most important public health issues worldwide. Moreover, an extreme obesity phenotype, morbid obesity (MO) (body mass index, BMI  $\geq 35$  kg/m<sup>2</sup>) has insidiously become a global problem. In this study, we aim to document the MO prevalence trend and to unveil the epidemiological characteristics of MO in Taiwan.

**Methods:** We took advantage of the data from 3 waves of nutrition and health survey in Taiwan (NAHSIT): 1993-1996, 2005-2008, and 2013-2014 to assess the prevalence trends.

There were 39 MO (BMI  $\geq 35$  kg/m<sup>2</sup>) cases identified in the two recent surveys. Age ( $\pm 3$  years), gender and survey matched normal weight controls (NW; BMI: 18.5-24 kg/m<sup>2</sup>) were selected in a 4 to 1 ratio.

**Results:** Both the prevalence of obesity (11.8 %, 17.9 %, to 22.1 %) and MO (BMI  $\geq 35$  kg/m<sup>2</sup>) (0.4 %, 0.6 %, to 1.9 %) increased sharply in the latest survey. MO cases tend to have lower level of education and personal income. Furthermore, these MO cases were likely to be betel nut chewers (p=0.0138) and they were associated with a dietary pattern featured with a higher consumption frequency of animal products, sweetened beverage, but lower frequencies of legume, fresh fruits, nuts, pastry and dessert, and seaweed (odds ratios are 7, 9, 47 for Q2, Q3, and Q4, respectively, compared to Q1 of the dietary pattern score; p for trend=0.00001).

**Conclusions:** In summary, this study documents the drastic increase in the prevalence rates of obesity and MO in the last 2 decades in Taiwan. Epidemiological characteristic study indicates that MO is likely a result of health inequality.

#### T-P-3205

##### **More Differences on the Screen Than the Plate?:**

##### **Preschool-Aged Children with Severe Obesity: NHANES 1999-2012**

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**Background:** As part of a broader effort of the AAP Institute for Healthy Childhood Weight and Children's Hospital Association Expert Exchange, this analysis was conducted to better characterize diet and screen time patterns of children with severe obesity using nationally-representative data.

**Methods:** Children ages 2-5 (N=6152) from NHANES (1999-2012) were classified by weight status: normal weight (NW) (BMI < 85th %ile), overweight (OW) (BMI  $\geq 85$ th but < 95th %ile), obesity (OB) (BMI  $\geq 95$ th but < 120% of 95th %ile), and severe obesity (SO) (BMI  $\geq 120$ % of 95th %ile). Energy intake (EI) and Healthy Eating Index (HEI) based on 24-hour recalls were evaluated with linear regression. Daily screen time (ST), combined reported hours of TV/computer/video games, was evaluated with multinomial logistic regression using NW as referent.

**Results:** Survey-weighted proportions by weight category were: 76.7% NW, 12.6% OW, 8.6% OB, and 2.1% SO. Mean EI was 1591 kcal/d. The EI of children with OW was 74 kcal/d higher (p=0.03) compared to NW peers, but differences for children with OB (62 kcal/d) and SO (23 kcal/d) were not significant (all p>0.10). Mean HEI for children with NW was 50.6, with no significant difference for OB at 48.5 (-1.6, p=0.05) and SO at 48.6 (-0.4, p=0.8). Children with ST > 2 hr/d was 57.0% (NW), 58.4% (OW), 66.3% (OB), and 69.8% (SO), which was associated with higher odds of OB (OR 1.4, p<0.01). Children with ST > 4 hr/d was 14.6% (NW), 16.1% (OW), 21.3% (OB), and 30.4% (SO), which was associated with elevated odds of OB (OR 1.6, p<0.01) and SO (OR 2.4, p<0.01).

**Conclusions:** Children were more likely to engage in double the recommended limit of daily ST than peers, and 30% had > 4 hours a day of ST. Differences in self-reported energy intake and diet quality between children with SO and NW peers were minimal and not significant, though possible bias with proxy-

reported dietary report and unequal sample distribution are important limitations.

**T-P-3206**

**Overcoming the Weight Loss Plateau in Patients Treated with a Low Carbohydrate Diet**

Charles Nguyen *Long Beach CA*

**Background:** A common observation in a typical weight loss (WL) program is a plateau in body weight after several months of successful weight reduction. This effect has been seen in many types of programs including those that restrict caloric intake, recommend a particular combination of foods, or use specific WL medications. This study examined the results of a WL program specifically designed to overcome this plateau.

**Methods:** A pilot observational study was conducted with patients enrolled in a physician-supervised medical WL program. Patients in the active WL (AWL) phase of the program had regular weigh-ins, offered individualized WL medication, counseled using a biopsychosocial approach, and prescribed a low carbohydrate diet to lower insulin level. Patients that remained on treatment for at least 40 weeks of a 52-week study period, were examined. To counter the WL plateau, patients were in the AWL phase for 20 weeks, transitioned to a 12 weeks maintenance phase with medication discontinuation and reintroduction of carbohydrates to increase insulin level, and then returned to AWL to the end of the study. The primary outcome variable of interest was WL (kg) from baseline to the end of each phase of the program.

**Results:** A total of 10 patients were included in the analysis. Mean age was 47.1, and 60% were female. Mean baseline weight= 106.5, BMI=37.9. Patients lost an average of 17.75 kg (16.6%) of baseline body weight at 20 weeks (AWL phase), plateaued during the maintenance phase, and lost additional weight once they returned to AWL treatment. Total mean WL at the end of the study was 23.61 kg (22.2%), and BMI=29.55.

**Conclusions:** A diet low in carbohydrates lowers insulin and helps patients burn fat and lose weight. Reintroducing carbohydrates causes insulin level to rise. As shown here, the WL plateau can be successfully overcome by actively lowering insulin again. This is more difficult if patients remain on a low carbohydrate diet throughout the WL program.

**T-P-3207**

**Overweight Children's Eating Behavior and Associations with Parent Feeding Practices and Concern for Child Weight in Treatment-Seeking Families**

Cody Neshteruk *Chapel Hill North Carolina*, Gina Tripicchio *Chapel Hill North Carolina*, Myles Faith *Chapel Hill NC*

**Background:** Controlling feeding practices by parents have been linked to childhood obesity; however, their associations with child eating behaviors is understudied. Higher 'Food Responsiveness' (FR), Slower Eating (SE), and poorer 'Satiety Responsiveness' (SR) predict childhood obesity. We examined in this study whether FR, SE, and SR were associated with 1) parental pressure to eat and restrictive feeding, and 2) parental concern for child weight.

**Methods:** Participants were 48 families of 4-8 year old overweight/obese children enrolled in a family-based obesity treatment study [average age = 6.8 years old, mean BMI percentile 96.5]. FR, SE, and SR were assessed by the Child Eating Behavior Questionnaire. Parent feeding practices and concern for child weight were assessed using the Child

Feeding Questionnaire. Weight and height were directly measured. All analyses were done using SPSS 22.

**Results:** For aim 1, greater SE ( $r = 0.33$ ,  $p = 0.03$ ) and SR ( $r = 0.38$ ,  $p = 0.01$ ) were correlated with parental pressure to eat. Thus, parents pressured to eat children who were slower eaters and more responsive to satiety cues. Greater FR was associated with parental restrictive feeding ( $r = 0.51$ ,  $p < 0.001$ ). Thus, restriction was heightened towards children more responsive in eating related to food cues. For aim 2, parents reported greater weight concern for children with poorer SR ( $r = -0.38$ ,  $p = 0.02$ ) and greater FR ( $r = 0.40$ ,  $p = 0.01$ ).

**Conclusions:** Parents used differential feeding control strategies with children higher in FR compared to SR, which could exacerbate further child weight gain. Future research should probe specific parental concerns about and responses to specific child eating patterns, as these could undermine healthy eating and energy balance.

**T-P-3208**

**Polyol Intake, Blood Glucose and Blood Pressure in US College Students**

Brittany Navrkal *Omaha Nebraska*, Eric Nelson *Kingston RI*, Kathleen Melanson *Kingston Rhode Island*

**Background:** Polyols, or sugar alcohols, are poorly digested carbohydrates that display prebiotic effects and, therefore, may influence blood glucose regulation. Polyol intake has increased alongside their reputation as low calorie sweeteners. However, polyols and a polyol subclass, sorbitol, have not been explored in the general US population and their potential metabolic effects have not been well elucidated. The purpose of this cross-sectional study was to examine consumption of polyols in US college students ( $n=343$ , body fat percent=25.5±9.2%, 83% female) and differences between high and low consumers. **Methods:** Intake of total polyols and sorbitol were quantified by the Comprehensive Nutrition Assessment Questionnaire. Blood glucose and lipids were measured by Cholestech LDX®, body fat percent by BODPOD®, and waist circumference and blood pressure by standardized instruments and protocols. Median split was used to classify subjects into groups of high and low intake for grams of total polyols and sorbitol consumed per 1000kcal(g/1000kcal). Differences in dependent variables were analyzed by independent samples t-tests.

**Results:** Subjects consumed an average of 4.0±3.3 grams total polyols and 3.1±2.4 grams sorbitol daily. Compared to subjects in the lower median, subjects in the upper median for polyols (g/1000kcal) and sorbitol (g/1000kcal) exhibited lower blood glucose (82±8 vs. 84±7mg/dL;  $p=.008$  and 82±7 vs. 84±7mg/dL;  $p=.025$  respectively), systolic blood pressure (114±15 vs. 117±14mmHg;  $p=.039$  and 113±15 vs. 118±14mmHg;  $p=.012$ ) and diastolic blood pressure (72±9 vs. 74±9mmHg;  $p=.037$  and 72±9 vs. 75±9mmHg;  $p=.007$ ).

**Conclusions:** Polyol intake was low in this population. However, even within this range, results suggest higher polyol intake may impact blood glucose and blood pressure in healthy US college students. Long term, dose-response, and mechanistic studies are needed to further assess potential relationships, including in at-risk populations.

**T-P-3209**

**Quantity and Quality of Dietary Sugars: Associations with Health Outcomes in Healthy College Students**

Eric Nelson *Kingston Ri*, Brittany Navrkal *Omaha Nebraska*, Kathleen Melanson *Kingston Rhode Island*

**Background:** Obesity and cardiovascular diseases (CVD) are leading causes of death in the US and may be influenced by sugars consumption. Research on body fat % (BF%), body mass index (BMI) and markers of CVD is inconsistent and is often observed at intakes above the 95th percentile. Therefore this study examined associations between quantity (<25% and >25% energy total sugars) and quality (fructose-containing and non-fructose containing) of dietary sugars with BF%, BMI, total cholesterol (TC) and low density lipoprotein cholesterol (LDL-c).

**Methods:** This cross-sectional study (n=343; BF%=25.5±9.2%; 83% female; kcals=2332.7±951.6; %energy sugars=22.7±7.6%) collected dietary data using the validated Comprehensive Nutrition Assessment Questionnaire, BF% using BOD POD and blood lipids using Cholestech LDX. Data were split into <25% and >25% energy total sugars before analyses using Pearson correlations.

**Results:** In subjects with <25% energy total sugars, energy from fructose-containing sugars correlated to BF% (r=.136,p=.044), while energy from non-fructose containing sugars negatively correlated to BMI (r=-.241,p=.001) but positively correlated with TC (r=.138,p=.048). Also, as percent carbohydrate consumed, fructose-containing sugars correlated to BF% (r=.189,p=.005) and non-fructose containing sugars correlated to TC (r=.196,p=.003) and LDL-c (r=.183,p=.009). In contrast, when consumed at >25% energy total sugars, non-fructose containing sugars (grams) negatively correlated to BF% (r=-.264,p=.010).

**Conclusions:** These results suggest that quantity and quality of sugars associate with obesity and CVD risk. Even when consumed at <25% energy total sugars, fructose-containing sugars may have harmful associations with BF% and non-fructose containing sugars with TC and LDL-c. However, non-fructose containing sugars in all subjects showed beneficial associations with BMI or BF%. Research is needed to clarify risks of sugars consumption in young adults and other populations on obesity and CVD.

#### T-P-3210

##### Sensory Evaluation of Traditional Wheat and Corn-Based Products Added with Dehydrated Nopal: Churritos and Polvorones

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**Background:** Production and consumption of nopal is quite important in Mexico. Culinary applications for this product are many, since can be offered in a wide range of presentations, mainly for the soluble and insoluble fiber (gums, pectin and mucilage) that contains. Some of its nutritional properties are remarkable; provides natural protection against diabetes, for its hypoglycemic effect, and osteoporosis as a result of acting as a supply of calcium. The objective of this project is to elaborate traditional wheat and corn-based products added with dehydrated nopal (churritos and polvorones): pilot test.

**Methods:** Pilot test: Three samples of polvorones were elaborated with wheat flour and 3 samples of churritos with corn flour, adding different concentrations of nopal powder (4, 6 y 8 %). The sensory evaluation of the products was carried

out by 30 gastronomy students (15 per product). During the test the participants tasted 5g of product and filled a descriptive flavor and texture survey. The research data were analyzed with the statistics package Excel 2013, frequencies and standard deviation were calculated. The sensory evaluation may be carried out by elementary students to determine their preferred.

**Results:** Research data shown that, polvorones 6% and churritos 4% were preferred among the other samples. Polvorones were perceived with an opaque color and a high sweet, slightly acid, and no bitter flavor; in contrast, churritos had a medium bright color and an almost imperceptible salty flavor.

**Conclusions:** The pilot test determined that the 6% polvorón sample added with nopal powder and the 4% churrito sample added with nopal powder had the best organoleptic properties.

#### T-P-3211

##### Significant Beneficial Association of Dietary Selenium Intake with Reduced Body Fat

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**Background:** Selenium(Se) is an important trace element involved in lipid metabolism and adipogenesis. Some studies suggest Se might be associated with obesity. However, there are few studies on the association between dietary Se intake and obesity and the findings are inconsistent. In the study, the associations between dietary Se intake and a whole panel of obesity measurements were investigated in the large population based study.

**Methods:** A total of 3214 subjects from the CODING study were assessed. Dietary Se intake was evaluated from the Willett Food Frequency Questionnaire. Obesity measurements were performed using dual-energy X-ray absorptiometry.

**Results:** Both obese men and women had the lowest dietary Se intake(µg/kg/day), which were 24% to 31% lower than normal weight men and women, respectively, based on BMI and total body fat percentage(BF%). In turn, subjects with the highest dietary Se intake had the lowest body weight, BMI, waist circumference(WC), trunk fat percentage(TF%), android fat percentage(AF%), gynoid fat percentage(GF%) and BF%. A clear dose-dependent inverse relationship was observed in both women and men. Moreover, strong and consistent negative correlations were discovered between dietary Se intake and all obesity indexes: body weight(r=-0.52 for women and -0.46 for men, P<0.01 for both), BMI(r=-0.49 for women and -0.43 for men, P<0.01 for both), WC(r=-0.49 for women and -0.46 for men, P<0.01 for both), BF%(r=-0.41 for women and -0.43 for men, P<0.01 for both), TF%(r=-0.41 for women and -0.43 for men, P<0.01 for both), AF%(r=-0.40 for women and -0.41 for men, P<0.01 for both) and GF%(r=-0.30 for women and -0.346 for men, P<0.01 for both), which were independent of age, total dietary calories intake, and physical activity. Dietary Se intake alone could explain 9-27% of variations of body fat.

**Conclusions:** Findings from this study strongly suggest that high dietary Se intake is associated with a beneficial profile of body composition in both normal and obese population.

#### T-P-3212

### Significantly Negative Association Between Dietary Selenium Intake and Insulin Resistance in the Newfoundland Population

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**Background:** Selenium (Se) may mimic insulin function and has the ability to improve insulin resistance (IR). Se was thought to protect against the development of type 2 diabetes mellitus (T2DM). However, recent studies have shown that high Se exposure may increase the risk of T2DM and IR. We investigated the association between dietary Se intake and IR in the study with a broad range of dietary Se intake.

**Methods:** Data of 3054 subjects without DM from the CODING study were analyzed. Dietary Se intake was evaluated from the Willett Food Frequency Questionnaire. Fasting blood samples were collected for the measurement of glucose and insulin (FPI). IR and  $\beta$  cell function were determined with the homeostasis model assessment (HOMA). Body composition was measured using dual-energy X-ray absorptiometry.

**Results:** High HOMA-IR groups had the lowest dietary Se intake ( $\mu\text{g}/\text{day}/\text{kg}$ ), which was 18% and 11% less than low HOMA-IR groups both in women and men, respectively. FPI, HOMA-IR and HOMA- $\beta$  presented the dose-dependent decrease with dietary Se intake increase in both women and men, after controlling for age, total calorie intake, physical activity, serum calcium and serum magnesium ( $P < 0.05$  for all). After additional adjustment for total body fat percentage, these differences among groups were weakened in women and disappeared in men. As dietary Se intake increased, IR decreased correspondingly, and the effect reached a plateau at the level of  $2.0 \mu\text{g}/\text{kg}/\text{day}$ . Dietary Se intake was negatively correlated with FPI, HOMA-IR and HOMA- $\beta$ , after adjusting for the confounding factors ( $r: -0.09 \sim -0.16$ ,  $P < 0.05$ ), when it was below  $2 \mu\text{g}/\text{day}/\text{kg}$ . In the range of 2 to  $4 \mu\text{g}/\text{day}/\text{kg}$ , the correlations between dietary Se intake and FPI, HOMA-IR, HOMA- $\beta$  were significantly weakened in women ( $r: -0.08 \sim -0.14$ ,  $P \leq 0.01$ ) and disappeared in men.

**Conclusions:** Our findings revealed a weak but significantly negative association of dietary Se intake with IR. Moreover, the beneficial effect was mainly significant when dietary Se intake was below  $2 \mu\text{g}/\text{kg}/\text{day}$ .

### T-P-3213

#### Slim by Design Registry – an Effort to Increase Understanding of Lifelong Success in Weight Control

Anna-Leena Vuorinen *Ithaca New York*, Megan Zhou *Ithaca CT*, Brian Wansink *Ithaca NY*

**Background:** Studying people who are at a healthy weight and do not struggle with weight problems has potential to provide new insights into weight control research.

**Methods:** Slim by Design (SBD) Registry was built to research characteristics and behaviors of people who do not suffer from excess weight. The aim of the SBD registry was to increase understanding of health behavior of slim people and provide new tips for weight control. Web-based lifestyle survey, created and maintained by Cornell University Food and Brand Lab, was available for volunteer participants. The inclusion criteria were self-reported BMI between 17-29.9 and

never receiving psychological consultation for weight or eating problems. Participants were asked open-ended questions about their dining and exercise habits, health behavior and weight control strategies.

**Results:** Of 168 members, the majority (73%) were women with mean age of 39 years and BMI  $21.7 \text{ km}/\text{m}^2$ . Five percent of participants had BMI below 18.5 and nine per cent had BMI above 25. Typically participants had become aware of their weight at the age of 11-14 years. Almost one third (29%) reported they exercised 0-2 times a week whereas 39 (23%) participants exercised 6-7 times a week. 73 (44%) participants reported that they were never on diet. Eating breakfast was reported almost all of the participants (96%). 96 (57%) and 119 (71%) participants reported eating vegetables or salad in connection with lunch or dinner, correspondingly. Participants did not monitor their weight regularly, 45 (27%) responded weighing themselves 'infrequently' of 'yearly'. The most common strategy used to resist overeating was 'Do not buy food at home'. As an experience that motivated participants to avoid excess weight, 20 (11%) responded an 'Obese family member'.

**Conclusions:** This research provided a description of SBD registry members - people who do not struggle with their weight and never gained weight in the first place.

### T-P-3214

#### Study on the Correlation between Instant Noodle Intake and Cardiometabolic Risk Factors of Healthy Korean University Students

Bumjo Oh *Seoul South Korea*, Eugene Joe, Soojin Kim

**Background:** South Korean people have consumed over 3.6 billion packages of instant noodles in 2013, which was the highest figure in the globe. According to the 2012 Korean National Health Statistics Report, the early mortality during the age from the twenties to the forties caused by cardiovascular disease has been increased. This study is aimed to define the correlation between instant noodle intake and cardiometabolic risk factors of healthy young men and women who are 18 to 29 years old.

**Methods:** A total of 3,876 subjects with the age of 18 to 29 years were selected from the same university. The subjects had gone through the same regular physical exam in 2013 and had no history of chronic disease. 2013 web survey and health check-up data including questionnaires on eating habits and health behavioral habits have been used for this study. Also, serum cholesterol subfractions, fasting glucose, blood pressure and physical data including body weight and waist circumference were measured.

**Results:** BMI, abdominal circumference, blood pressure, fasting glucose level, low HDL level, triglyceride level, number of metabolic syndrome components significantly increased according to the higher frequency of instant noodle intakes. Even after the control of potential confounding factors (health behavioral variables, other food intake variables), BMI, abdominal obesity, systolic blood pressure, diastolic blood pressure and serum triglyceride level have been statistically increased in accordance with the frequency.

**Conclusions:** This study suggests that the frequency of instant noodle intakes is significantly correlated to the cardiometabolic risk factors of healthy 18-29 year olds.

**T-P-3215****Sugar Intake in the U.S. Diet: Consumption Patterns by Type (Added vs. Naturally Occurring) and Physical Form (Liquid vs. Solid)**Christina Brumme, Jean Welsh *Atlanta Georgia*

**Background:** The health effects associated with dietary sugars vary with some linked to positive and others to negative outcomes. As little information is available on sugar consumption patterns in the U.S., the purpose of this study was to describe consumption by sugar type (added vs. naturally occurring) and physical form (liquid vs. solid).

**Methods:** Data from the National Health and Nutrition Examination survey, and the Food Patterns Equivalence Database was used to estimate mean intake of total and added sugars for all Americans >2 y (n=16,973). Food and Nutrient Database for Dietary Studies (FNDDS) codes and descriptions were used to categorize the sugars consumed as: added (AS) vs naturally occurring (NOS) and as liquid (beverages) vs. solid (foods). In addition, all sugars were identified as being from a dairy vs. non-dairy source. Weights were applied to obtain nationally representative intake estimates that were compared across demographic subgroups. Analytical procedures to account for complex sampling methods in NHANES were used.

**Results:** Among all >2 years, mean total sugar, AS, and NOS intakes were 118 g (22.8% energy), 75.3g (14.1% energy), 42.9g (8.8% energy), respectively. Dairy products contributed 17% of total sugars (20.1g). Almost half of AS, 38.4g and slightly more than half of NOS, 25.9g, came from beverages. Milk contributed 58% (15.1g) of the NOS consumed in beverages. AS consumed in beverages decreased from 44.5g to 28.1g and NOS in juices decreased from 51.7g to 32.4g as income rose from the lowest to the highest tertile. AS consumption levels rise throughout childhood and decrease throughout adulthood.

**Conclusions:** The contribution of added vs. naturally occurring sugar and of sugar in liquids vs. beverages to the U.S. diet varies markedly by income and age. Further research is needed to better understand the impact that these differences may be having on obesity and chronic disease risk.

**T-P-3216****The body recognizes liquid calories: Systematic review and meta-analysis of the effect of solid versus liquid preloads on subsequent energy intake.**Danielle Greenberg *Purchase New York*, Maïke Rahn *Valhalla NY*, Andrew Brown *Birmingham Alabama*, Brandon George *Birmingham Alabama*, Alicia Chung *Valhalla NY*, David Alison

**Background:** A common statement underlying obesity-related advice is that “the body does not recognize liquid calories.” An alternative hypothesis is that “the body does not compensate for liquid calories to the same extent as solid calories.” We evaluated empirical evidence for these hypotheses in humans by meta-analyzing studies measuring ad libitum energy intake after a liquid, semi-solid (SS), or solid preload within the same experiment.

**Methods:** We systematically searched for randomized, cross-over studies investigating calorie-containing preloads on energy intake at a subsequent test meal (intake). Intake was modeled using an inverse variance, mixed models approach, with a random effect for publications, and fixed effects of

preload size, time between preload and test meal (time and time-squared), preload type, and all interactions. The 3-way interaction and the preload type-by-time interactions were not significant and were removed from the model.

**Results:** Thirteen papers met inclusion criteria (50 study arms): they included at least two of liquid, SS, or solid preloads; and reported intake (282 to 1835 kcal), preload size (20 to 430 kcal), and time (5 to 300 min). After preload, intake initially decreases with a nadir around 55 min and then increases. At small preload sizes, intake is larger after liquid than solid preloads, but differences decrease with increasing preload size until they converge (~350 kcal preloads). SS tended to track with liquids, but only 7 studies included SS. Four studies included only liquid vs SS; when these were removed, the liquid vs solid model remained qualitatively similar. Leave-one-study-out analyses showed 3 studies influenced various aspects of the model, but the qualitative conclusions remained unchanged.

**Conclusions:** These data support that liquid calories are recognized by the body, but not as well as solid calories at lower preload sizes. Insufficient data were available to estimate Influences of preload composition (e.g., protein, fiber) and no-calorie preloads.

**T-P-3217****The Cost of Implementing Three Popular Weight Loss Programs in Comparison with Typical Food Expenditures**Amy Krauss *Boston Massachusetts*, Sai Das *Boston MA*, Carrie Brown *Somerville MA*, Madeleine G. Gamache *Boston MA*, Amy Taetzsch *Boston Massachusetts*, Cindy Chen *Boston MA*, Michelle Berkenstock *Boston Massachusetts*, Susan Roberts *Boston Massachusetts*

**Background:** The cost of healthy food is widely viewed as a barrier to successful weight control.

**Methods:** To test this claim the cost of meals recommended in popular weight loss programs were priced at supermarket chains in the Greater Boston area, and values were compared to Consumer Expenditure Survey (CES) data on average daily expenditure on food for the year 2013-2014. The programs examined were the Diabetes Prevention Program (DPP), iDiet (IDI) and the Paleo diet (PD). The cost of each diet was determined for 16 days' of meals, each day including a breakfast, lunch, dinner, and snacks consistent with the program. Prices were collected from 3 supermarkets: Whole Foods (WF), Peapod (PP), and Market Basket (MB) during the months of January and February 2015. A two-way ANOVA and single t-tests were used to assess the difference in means. P-values <0.05 were considered statistically significant.

**Results:** DPP, IDI, and PD diets cost an average of \$9.25, \$9.83, and \$20.19 respectively per day, compared to CES's estimated \$12.80 spent per day on average. There was no significant difference between the costs of DPP and IDI, and both were significantly less expensive than PD and CES estimates. PD increased food expenditures by 105-118% compared to IDI and DPP, and costs were greater than CES's food expenditure by an average 36.6%. There were also significant effects of the store on food prices, with WF costing 29-60.4% more than PP or MB.

**Conclusions:** Both DPP and IDI weight loss plans cost less to implement than current mean CES's estimated food expenses, indicating that cost does not need to be a significant barrier for these weight loss plans. DPP and IDI, but not PD, appear to be reasonably priced options for weight control, especially when food purchases are made at more economical stores. Overall,

food for healthy weight control does not have to be expensive, but costs are influenced by the selected program and frequented supermarket.

**T-P-3218**

**The effect of self-monitoring on weight loss therapy: systematic review .**

Katia Estrada-Ruelas *Tijuana Baja California*, Arturo Jimenez-Cruz *Tijuana Not Listed or Not Applicable*, Montserrat Bacardi-Gascon *Tijuana Baja California*, Psyche Calderon-Vargas *Tijuana Baja California*

**Background:** Different studies have shown a strong relationship between self-monitoring and weight loss. The objective of this review is to analyze experimental studies using self-monitoring as a strategy for weight loss.

**Methods:** A search was conducted in PubMed database of randomized controlled trials using self-monitoring for weight loss in adults, published in English and Spanish, from January 1st, 2009 to December 31st, 2014. The sample size, age, weight loss and BMI, the intervention strategy, the retention rate, duration of the intervention were recorded.

**Results:** Ten studies met the selection criteria. The intervention and the follow-up ranged from three to 12 months. The study population included subjects from 50-210. The age ranged from 18-74 years old. Weight loss ranged from 0.5 to 2.3 kg in the control group and 1.3 to 6.6 kg in the intervention group.

**Conclusions:** In this review we consistently found greater weight loss in the group with self-monitoring. These results suggest the need to use self-monitoring as a strategy for weight loss.

**T-P-3219**

**The Impact a Breakfast Has on Making a Person Slim by Design**

Anna-Leena Vuorinen *Ithaca New York*, Camille Finn *Ithaca New York*, Brian Wansink *Ithaca NY*

**Background:** The importance of breakfast and its relation to weight loss success is recognized. Studying breakfast habits of people who have been at a healthy weight throughout their lives may provide new insights into obesity research.

**Methods:** Slim by Design (SBD) registry was built for the purposes of studying characteristics and behaviors of people who are at a healthy weight and do not struggle with weight problems. Data from 168 registry members (72% female, age:39 years, BMI:21.7 kg/m<sup>2</sup>) were used to analyse their breakfast patterns. Based on the frequencies of food items listed in two questions 'When you eat breakfast, what kind of breakfast do you most often eat' and 'On an average day, what would you have for breakfast?' breakfast items were categorized to 21 categories. The results are tied with findings of National Weight Control Registry (NWCR) that studied people who lost weight and successfully kept it off long-term.

**Results:** The most common breakfast items were fruits (44%), eggs (29%), bread (29%), hot cereal (28%), coffee (26%), dairy (23%) and cold cereal (18%). The average number of items for breakfast was three. Six (3%) participants responded they do not eat breakfast which is comparable with the rate of 4% of members of NWCR who never ate breakfast. Women were more likely to have fruits (p=.054), milk (p=.056), dairy (p=0.056), nuts/seeds (p=.051) and include condiments (p=.029) whereas men were more likely to report skipping

their breakfast (p=.059). Fruit consumption of SBD members was higher compared to the members of NWCR of whom 24% responded usually eating fruits. Cereal consumption (43% reported eating either hot or cold cereal) was higher than the 30% of NWCR members.

**Conclusions:** Healthy food items played a major role in breakfast habits of subjects without weight problems. Fruit and cereal consumption during breakfast were higher in Slim by Design Registry members compared to National Weight Control Registry members.

**T-P-3220**

**The Type of Snack Matters: Longitudinal Associations between Snacks, Fruit as Snacks and Energy Dense Snacks and BMI Z-Score Over Time among Chinese Children and Adolescents**

Lindsey Smith Taillie *Chapel Hill North Carolina*, Dantong Wang *Lausanne Vaud*, Barry Popkin *Chapel Hill North Carolina*

**Background:** Snacking among children is linked with excessive energy intake and overweight/obesity (OVOB). Chinese snacking is rapidly increasing and shifting toward more energy-dense foods. Few studies have examined the longitudinal association of snacking and food type with child overweight/obesity.

**Methods:** Using data from 3 waves of the China Health and Nutrition Survey (2006, 2009, 2011), we used linear mixed effects models to longitudinally examine the association between snacking (none, low, medium, and high) and WHO BMI-z score among children aged 2-6 and 7-13 at baseline (2006), controlling for confounders. We also tested whether this association differed by whether children were OVOB at baseline and whether children were high consumers of fruit as snacks or energy-dense snacks (e.g. cookies, crackers).

**Results:** For OVOB children age 2-6 and 7-13y, increased snacking was associated with larger declines in BMI z-score over time (-.82 and -1.4, respectively [p<0.05]); however, for normal weight children, snacking was not associated with changes in BMI z-score. For OVOB children, top snackers 2-6y who consumed 75% snack calories from fruit showed a 2.1 increase in BMI z-score, whereas among 7-13y, fruit intake was associated with bigger declines in BMI z-score relative to non-fruit eaters (-3.1 vs. -2.3, respectively (p<0.05)). Among normal weight children, consuming 75% of snack calories from energy dense snacks was associated with a 0.09 increase in BMI z-score for 2-6y but had no association for 7-13y. For OVOB children of both age groups, non-consumers of high energy dense snacks showed larger declines in BMI z-score over time than did high consumers of energy-dense snacks.

**Conclusions:** Snacking is associated with reduced weight gain over time among Chinese children, especially for those already OVOB. However, the type of snack matters, and high energy dense snacks are associated with increased weight gain or reduced weight loss over time for normal weight and OVOB children, respectively.

**T-P-3221**

**The Use of Photo Food Logs in a Pediatric Obesity Treatment Program: Development of a Reliable Scoring System**

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**Background:** The use of food records for intake monitoring and weight management has been shown to be effective in adults, but anecdotal evidence suggests they can be difficult or burdensome for children and adolescents to complete. The Strong4Life Photo Food Log was developed as a novel way to assess diet quantity and quality by food groups in order to facilitate improved intake monitoring and counseling provided by nutritionists at a pediatric obesity treatment clinic. The purpose of this study was to assess the reliability of the Strong4Life Photo Food Log

**Methods:** Five registered dietitians specializing in pediatric weight management were provided with cell phone photos of meals taken by 20 patients enrolled in an obesity treatment program. Dietitians were instructed to score each photo, providing subsection scores (fruits & vegetables, grains, proteins) and an overall plate score (range 0-100). Reliability of the instrument was assessed using intraclass correlation analysis to compare plate scores (Shrout-Fleiss reliability test of mean (k) scores).

**Results:** The overall plate score average measure ICC was 0.70 (95% CI: 0.53, 0.85). For specific food groups, scores were even more highly correlated (Grains: ICC = 0.81 (95% CI: 0.69, 0.91); Proteins: ICC = 0.86 (95% CI: 0.76, 0.93); Fruits and Vegetables: ICC = 0.91, (95% CI: 0.83, 0.96).

**Conclusions:** The Strong4Life Photo Food Log provides a reliable means to assess diet quality suggesting that it may be a user-friendly means of facilitating dietary counseling of youth.

#### T-P-3222

##### Understanding Determinants of Weight Bias among Dietetics and Nutrition Students

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**Background:** Despite the increasing prevalence of obesity in the United States, negative attitudes towards obese individuals are widespread. Overweight and obese individuals are perceived as undisciplined, inactive, and unappealing. Health care providers, including dietetics and nutritionist are not exempt from showing bias towards obese individuals, which may undermine treatment and lead to subsequent psychological and health problems. The purpose of this study was to measure the extent of weight bias among dietetics and nutrition students as well as investigate its determinants.

**Methods:** A cross-sectional survey (n=286) was conducted at a large Midwestern University to assess students' weight bias using the Fat Phobia Scale. Eating competence was measured using the ecSI 2.0 and body dissatisfaction using the Stunkard Figure Rating Scale. Other variables included experience with obesity, media exposure to health and nutrition information and demographic characteristics.

**Results:** About 35% of the participants had weight bias, 67% were unsatisfied with their body image and none of the participants had eating competence. Media exposure on health information, body dissatisfaction and eating competence were related to fat phobia (p<.05). A linear regression with stepwise selection to determine factors predict weight bias showed significant relationship with eating competency, body dissatisfaction, and ethnicity at p<.05.

**Conclusions:** These findings highlight that weight bias is an apparent issue among students enrolling in health related programs. Results are consistent with previous studies conducted in the United States. Considering their future role in

clinical and community setting, this issue should be addressed properly.

#### T-P-3223

##### Use of Ecological Momentary Assessment (EMA) to Assess Co-Occurring Physical Activity Behaviors and Food Choices in Mothers and Children

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**Background:** Increases in sedentary behavior and intake of energy-dense foods, which often co-occur, are implicated as modifiable health behaviors contributing to obesity risk. However, recall measures of activity behaviors and dietary intake are prone to errors and biases. This study used an innovative real-time data capture strategy, Ecological Momentary Assessment (EMA), to examine the co-occurrence of healthy and unhealthy food choices in the context of physical activity and sedentary behaviors in mother and child dyads.

**Methods:** Participants included 54 mothers (mean age=41.1, range 26-52 years) and their children (56% female, age range 9-12 years) enrolled in the Mothers and their Children's Health (MATCH) Study. Mothers and children responded to randomly-timed EMA survey prompts via smartphone up to 7 times per day during non-school time across 7 days. EMA surveys prompted participants to report recent (past two hours) exercise/sports, use of TV/videos/video games, and the consumption of vegetables/fruits (healthy) and fast food, sugar-sweetened beverages, sweets, and chips (unhealthy). We report preliminary descriptive statistics on the co-occurrence of activity and eating behavior.

**Results:** When mothers reported recent physical activity, 43% of those prompts also reported healthy food intake, and 19% reported unhealthy food intake. When mothers reported recent TV/videos/video games, 35% of those prompts also reported healthy food intake, and 25% reported unhealthy food intake. When children reported recent physical activity, 47% of those prompts also reported healthy food intake, and 30% reported unhealthy food intake. When children reported recent TV/videos/video games, 33% reported healthy food intake, and 31% reported unhealthy food intake.

**Conclusions:** Real-time data collection methods provided preliminary evidence that unhealthy food intake may accompany physical activity almost twice as much in children as compared with mothers.

#### T-P-3224

##### Using the New "Obesogenic Food Index" to Assess the Diet Quality of Adults in Association with Frequency of Restaurant Visits

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**Background:** There is a lack of a standardized tool that can assess the diet quality of an individual in relation to degree of weight change. We developed an "Obesogenic Food Index" (OFI), a predictive indicator of weight gain associated with daily servings of food types. We tested its construct validity using self-reports on servings/day of foods consumed and frequency of eating out (never/rarely; 1-3/mth; 1-2/wk; >3/wk) at a fast food (FF) and sit-down (SD) restaurant

**Methods:** Data from 1418 adults of Wisconsin, in which we previously found a positive association between frequency of eating at FF and SD with BMI were analyzed. The OFI was developed using the findings of a meta-analysis by Mozaffarain et al. that associated the weight change after 4-years with change in serving/day intake of 15 food categories. We ranked and combined food categories as: Obesity preventing foods (OPF; weight loss), Obesogenic foods I (OF I; weight gain  $0 \geq 0.5$ lb), Obesogenic foods II (OF II; moderate weight gain  $0.5 \geq 1$ lb), and Obesogenic foods III (OF III; weight gain  $>1$ lb). Linear regression analysis was performed to examine associations between frequency of eating at FF and SD restaurant and OFI categories.

**Results:** In our population, OF II foods comprised 40% of total daily servings, while healthier OPF comprised 22 % of daily servings. Frequency of eating FF was negatively associated ( $p < 0.001$ ) with the percent of total servings/day intake of OPF. The percent servings/day consumption of OF II increased significantly with increase in frequency of FF ( $p < 0.05$ ) and remained the same once it reached  $>1-2$ /wk (42.4% of total serving/day). Even a small increase of 1-3 times per month of either FF or SD consumption was associated with a statistically significant increase in OF III foods.

**Conclusions:** The OFI tool may be used reliably by researchers and nutritionists to understand the diet quality of individuals in relation to weight gain. Validity of this index however needs to be tested using a longitudinal dataset.

#### T-P-3225

##### What Can We Learn From People Who Stay Slim Without All Of The Blood, Sweat, and Tears?

Anna-Leena Vuorinen *Ithaca New York*, Brian Wansink *Ithaca NY*

**Background:** Understanding health behavior of people who stay at a healthy weight without bigger weight control efforts provides a new angle for obesity research with potential to unique tips for people struggling with excess weight.

**Methods:** Slim by Design (SBD) registry was built for the purposes of studying characteristics and behaviors of people who are at a healthy weight and do not struggle with weight problems. Of 168 registry members (72% female, age:39 years, BMI:21.7 kg/m<sup>2</sup>) we identified a subgroup (n=93) of mindlessly slim (MS) people, defined as participants who monitored their weight 'infrequently' or 'on the yearly basis' or who responded 'never being on diet'. Demographics, eating behavior and weight control behaviors of MS were compared to the rest of the group.

**Results:** Being MS was associated with male gender ( $p=.048$ ) and lower BMI ( $p=.021$ ) but there were no age difference ( $p=.851$ ). MS people exercised less frequently (39% vs. 24% exercised 0-2 times a week,  $p=.06$ ). Food intake during breakfast, lunch or dinner was not significantly different between MS people and the others but there were significant differences in eating behaviours. MS people were more likely to 'eat lots of fruits and vegetables', 'only eat when hungry' and 'have quality home cooked food' when they were asked 'What are things you regularly do that help you to stay slim'. As a means to resist overeating 'Purchase food but keep out of sight ( $p=.027$ )' and 'Discard ( $p=.021$ )' were negatively associated with being MS. MS people became aware of their weight at older age ( $p=.049$ ) and they were less likely to feel guilty after overeating (18% vs.43%,  $p=.001$ ).

**Conclusions:** Mindlessly slim people seem to have less

restrictive health behavior without preferences for certain foods. They eat only when they are hungry and prefer home-cooked foods that may be associated with lower consumption of energy-dense foods.

#### T-P-3226

##### Adolescent Obesity Risk Knowledge (AORK):Let the Discussion Begin

Elaine Rutkowski *Fullerton CA*, Cynthia D Connelly *San Diego CA*

**Background:** Studies show pediatric and family health practitioners' assessments and interventions for adolescent weight issues are negligible relative to the magnitude of the problem. Using an easily administered measure to capture a youth's awareness of obesity risks could provide a non-threatening introduction to a conversation between patient, parent, and practitioner.

**Methods:** Data were collected through self-administered questionnaires and focus groups. Using a mixed method design, a staged process led sequentially from (1) Quantitative data collection with the Obesity Risk Knowledge Scale (ORK-10), (2) focus groups, (3) scientific advisory group input, and (4) a second study using the Adolescent Obesity Risk Knowledge Scale (AORK) (adapted from the ORK-10).

**Results:** Ninety-four adolescents aged 12 to 15, ( $M = 12.8$ ,  $SD = 1$ ) reported a mean ORK-10 score 4.69 ( $SD = 1.63$ ) range 0 - 10, Cronbach's alpha = .53. Qualitative semi-structured interviews found lack of relevance and unfamiliarity with terminology for adolescents living in southern California. The AORK questionnaire augmented the ORK-10 with input from an adolescent and scientific advisory group. Eighty-three adolescents aged 12 to 15, ( $M = 12.9$ ,  $SD = 0.82$ ) recruited from the 3 middle schools within the southern CA school district used in Phase I completed the AORK. Mean AORK score 5.89 ( $SD = 2.01$ , range 0 - 10), Cronbach's alpha = .68.

**Conclusions:** The AORK a simple, but comprehensive assessment practitioners can integrate into their practices, has the potential to initiate a discussion of a routinely avoided topic. It may be a practical intervention for increasing PCP's adherence to mandates for preventive services surrounding obesity and unhealthy lifestyle practices in families of adolescents.

#### T-P-3227

##### Alteration of Adipokines and Biomarker of Endothelial Dysfunction in Obese Mexican Adolescents with or without Insulin Resistance

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**Background:** Obesity-associated insulin resistance (IR) is a major risk factor for type 2 diabetes and cardiovascular disease. Abnormality of adipokines, IR and endothelial dysfunction are three pathological conditions that can co-exist, even if their cause-effect relationship is not yet clarified

**Methods:** 44 obese Mexican adolescents and 52 subjects with normal weight were enrolled. The obese subjects were divided into two subgroups according to HOMA: with (n=23) or

without IR (n=21). The serum levels of soluble intercellular adhesion molecule 1 (sICAM-1), leptin and adiponectin were measured by ELISA

**Results:** A significant increase in sICAM-1 was observed in obese with or without IR compared with that in controls. Moreover, the sICAM was significantly increased in obese with IR than that in obese without IR ( $512.4 \pm 115.3$  vs.  $423.1 \pm 111.5$  ng/ml,  $p=0.02$ ). Increased levels of leptin were also observed in obese with or without IR compared with that in controls ( $31.7 \pm 25.2$ ,  $38.5 \pm 29.9$  and  $12.6 \pm 13.8$  ng/ml, respectively), however, no significant difference was observed between subjects with or without IR. The obese adolescents with IR also showed decreased levels of adiponectin compared with that in control ( $13.6 \pm 6.0$  vs.  $17.4 \pm 5.1$   $\mu$ g/ml). By Pearson analysis, sICAM-1 and leptin positively associated with weight, BMI, triglycerides, very-low-density lipoprotein (VLDL), insulin and HOMA; adiponectin associated with anthropometric variables and lipid profile in negative manner. Furthermore, sICAM-1 also positively associated with leptin in all studied subjects ( $r=0.235$ ,  $p=0.023$ )

**Conclusions:** Obese adolescents with IR demonstrated more abnormality in adipokines and endothelial dysfunction compared with those without IR, which may contribute to an increased risk for developing cardiovascular diseases in later life

#### T-P-3228

**Body Roundness Status: a Predictor for Metabolic Health in Children: Nutrition and Health Survey in Taiwan**  
Hsin-jen Chen *Taipei Maryland*, Wen-Harn Pan *Taipei Taiwan*

**Background:** One limitation of body mass index (BMI) is unable to characterize body composition and fat distribution. Body roundness index has been proposed to measure the dimension of body width in adults. Little is known whether body roundness is a useful measure for children.

**Methods:** Based on a population representative survey on elementary school students in Taiwan (n=2544), we examined children's body roundness status and its association with fasting plasma glucose and lipid profile. The eccentricity of a hypothetical ellipse, constructed based on the child's height and waist circumference, was calculated to assess body roundness. Median eccentricity was the cutoff to categorize body roundness status. The greater value the eccentricity, the leaner the body shape. Measured height and weight were converted to WHO BMI-for-age Z score. Z score  $>+2$  and  $>+1$  defined obesity and overweight, respectively.

**Results:** Eccentricity ranged from 0.974 to 0.994, which was correlated with age in girls (correlation coefficient  $[r]=0.16$ ) but not in boys ( $r=0.04$ ). All obese children were with the roundness status. Meanwhile, about one-third of normal weight boys and one-fifth of normal weight girls were categorized as with the roundness status. After weight status was controlled in models, body roundness was associated with higher triglycerides ( $+8.5$ mg/dL,  $p=0.024$  for boys) and lower HDL-c levels ( $-7.34$ mg/dL [ $p<0.001$ ] for boys and  $-2.39$ mg/dL [ $p=0.031$ ] for girls). The differences in triglycerides and HDL-c by body roundness status were significant in normal weight boys and overweight girls. In addition, glucose was associated with body roundness status in overweight boys only.

**Conclusions:** Eccentricity could serve as an age-independent measure of boys' fatness. Moreover, the roundness status, derived from eccentricity, may complement the utility of BMI-based weight status as a predictor of metabolic health in

children, in terms of predicting higher level of plasma glucose and lipid profile.

#### T-P-3229

**Comparability of sleep assessment in normal-weight and obese women as measured by hip and wrist worn accelerometers**

James Lecheminant *Provo Utah*, Lora Romney *Provo UT*, Kaylie Carbine *Provo UT*, Michael Larson *Provo UT*, Larry Tucker *Provo Utah*, Bruce Bailey *Provo UT*

**Background:** Accelerometers now have the dual benefit of assessing physical activity outcomes as well as sleep outcomes; both important correlates of obesity and overall health. However, where the accelerometer is worn may influence the data. Specifically, how sleep assessment differs when accelerometers are worn at the hip versus the wrist is not well-documented.

**Methods:** Utilizing 42 obese ( $BMI \geq 30$  kg/m<sup>2</sup>) or normal-weight ( $BMI 18.5-24.99$  kg/m<sup>2</sup>) women, this study compared assessment of sleep (total sleep time, sleep efficiency, number of awakenings, sleep latency) via hip-worn accelerometers versus wrist-worn accelerometers. Each participant was assessed for a single night ( $7.7 \pm 0.3$  hours of sleep;  $\sim 10:30$ pm –  $6:30$ am) wearing an accelerometer (Actigraph, LLC, Pensacola, FL) positioned at the hip and another accelerometer positioned at the wrist. Each participant verified the time retiring to bed in the evening and the moment arising from sleep in the morning using sleep records. Accelerometer data were analyzed for sleep outcomes using ActiLife data analysis software and associated algorithms.

**Results:** Using the Sadeh Equation, total sleep time was measured higher in the hip (+9%) and sleep efficiency was higher in the hip (+9%) compared to the wrist ( $p<0.0001$ ). On the other hand, number of awakenings was assessed higher in the wrist ( $20.19 \pm 6.72$  awakenings) compared to the hip ( $5.95 \pm 3.96$  awakenings) and sleep latency was assessed higher in the wrist (+60%) compared to the hip ( $p<0.0001$ ). The trend was similar when using the Cole-Krippe Equation. BMI level did little to influence the differences in sleep assessment between the hip and the wrist.

**Conclusions:** Where an accelerometer is placed influences sleep assessment and should be considered when utilizing these devices.

#### T-P-3230

**Comparison of Two Methods in Estimating Preconception Body Weight among Pregnant Women**

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**Background:** Retrospective studies faced huge difficulties when evaluating the effect of maternal preconception obesity and gestational weight gain (GWG) on infant adiposity and childhood obesity because of lacking of preconception weight. We tried and tested two methods of estimating preconception weight to solve the problem.

**Methods:** Pregnant women attending routine antenatal examination with complete data including preconception weight from a single hospital were recruited. Two methods were used to estimate preconception weight in 4635 pregnant women by assuming missing preconception weight. Method 1)

using LMS percentile curves of gestational weight; Method 2) the weight at first prenatal visit minus weight gain before the visit (gestational week multiplied by the rate of weight gain per week recommended by 2009 IOM). We compared preconception weight estimated by the two methods with the actual values.

**Results:** The differences between actual and estimated values were  $0.24 \pm 4.03$  kg by method 1 and  $0.49 \pm 3.78$  kg method 2, respectively. Actual values significantly correlated with the estimated values by method 1 ( $r=0.86$ ,  $P<0.001$ ) and method 2 ( $r=0.89$ ,  $P<0.001$ ). Classification of preconception BMI based on method 1 was similar with that the actual value did ( $\chi^2=2.61$ ,  $P=0.46$ ), but differed with that based on method 2 ( $\chi^2=49.85$ ,  $P<0.001$ ). The proportion of pregnant women within IOM recommendations estimated by method 1 and method 2 is similar to that the actual values did (37.73% vs. 39.70%,  $P=0.052$ ; 37.93% vs 39.70%,  $P=0.081$ ), but differed in proportions of insufficient GWG (1.79% vs. 11.33%,  $P<0.001$ ; 5.74% vs. 11.33%,  $P<0.001$ ) and excessive GWG according to IOM recommendations (60.47% vs. 48.98%,  $P<0.001$ ; 56.33% vs. 48.98%,  $P<0.001$ ) respectively.

**Conclusions:** LMS curves of GWG is helpful in estimating missing preconception body weight. Further studies are needed to test these methods and other methods to estimate preconception weight.

#### T-P-3231

##### Correlation Analysis of Visceral Fat Measured by Dexa with Serum ALT for Predicting Non-Alcoholic Steatohepatitis in a Cohort of Mexican Patients

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**Background:** Visceral fat (VF) secretes inflammatory substances including free fatty acids exposing the liver to accumulate them. ALT level is the most specific marker of steatohepatitis. VF might be directly related to fatty liver, and may be an independent predictor of steatohepatitis. The DEXA can evaluate the VF. The aim of this study was to evaluate the correlation between the VF measured by DEXA and the ALT levels in a cohort of Mexican patients.

**Methods:** Patients underwent to clinical assessment. The use of hepatotoxic medication, alcoholism, liver disease other than NASH were excluded. Anthropometric and laboratory data were determined. DEXA measured VF volume and area. Descriptive and inferential statistics were utilized.  $P$  value  $\leq 0.05$  was considered as statistically significant for a two-tailed hypothesis.

**Results:** 68 patients were included, 44 (64.7%) were female. Mean  $\pm$  SD age was  $41.8 \pm 12.3$  (15-67). Mean  $\pm$  SD BMI  $32 \pm 6.5$  kg/m<sup>2</sup> (20.7-56.1). Normal weight in 3 (4.4%) patients, overweight in 29 (42.6%), grade 1 obesity in 20 (29.4%), grade 2 obesity in 7 (10.3%), grade 3 obesity in 9 (13.2%). DEXA analysis showed a mean  $\pm$  SD VAT mass of  $835.3 \pm 371.6$  g, VAT volume of  $903.96 \pm 403.6$  cm<sup>3</sup>, VAT area of  $173.45 \pm 77.42$  cm<sup>2</sup>. Laboratories showed a mean  $\pm$  SD of glucose  $96.1 \pm 21.9$  mg/dL, A1C  $5.6 \pm 0.7\%$ , cholesterol  $200.9 \pm 42.9$  mg/dL, LDL  $121.96 \pm 26.11$  mg/dL, HDL  $50.9 \pm 16.9$  mg/dL, triglycerides  $143.74 \pm 106.2$  mg/dL, ALT  $32.45 \pm 20.6$  UI/mL. DEXA quantifications of VAT mass, vol and area resulted significantly associated to ALT levels: VAT mass ( $r$ Spearman = 0.54;  $p=0.0001$ ), VAT vol ( $r=0.54$ ;  $p=0.0001$ ) and VAT area ( $r=0.54$ ;  $p=0.0001$ ). HDL showed negative

correlation ( $r=-0.35$ ;  $p=0.003$ ). Waist circumference (WC) and waist/hip index showed significant correlation with ALT ( $r=0.57$ ;  $p<0.006$  and  $r=0.66$ ;  $p<0.0001$  respectively). A greater WC correlates with higher VAT mass and vol ( $r=0.87$  and  $0.87$  respectively;  $p<0.0001$ ).

**Conclusions:** We demonstrated that VF significantly correlates with ALT levels. This establishes the VF measured by DEXA as a useful indicator for NASH.

#### T-P-3232

##### Delivery by Caesarean Section and BMI-z at Age 5 Years: Within-Family Analysis

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**Background:** Previously reported associations of delivery by caesarean section (C-section) with childhood obesity may be confounded by maternal BMI and sociocultural factors. To address this possibility, we assessed this association within sibling pairs.

**Methods:** From the CENTURY Study, a longitudinal clinical database of well-child visits from 1980 to 2008 in eastern Massachusetts linked to each child's birth certificate, we examined the association of C-section with BMI-z at age 5 years among 16,140 siblings and their mothers from 8,070 families. We used a single linear mixed model, adjusted for mother's age, parity and race/ethnicity and child's age, sex, birth year, to decompose the total association into a within-family component and an additional between-family component. The outcome was observed BMI-z at 5 years.

**Results:** 7943 (49.2%) of the children were female, 3204 (19.9%) were delivered by C-section, and mean (SD) childhood BMI-z at was 0.48 (1.00) at a mean age of 5.3 (0.3) years. 3059 (23.6%) of the mothers were non-white and mean (SD) age was 31.1 (4.8) years. The within-family association of C-section v. vaginal delivery was 0.04 higher BMI-z at 5 years (95% CI -0.04, 0.11) and the additional between-family association was 0.13 (95% CI 0.04, 0.22).

**Conclusions:** The within-family effect of C-section was small, suggesting that previously reported C-section-childhood obesity associations may be confounded by unmeasured variables such as maternal BMI and sociocultural factors. This study highlights advantages of linking clinical and vital statistics databases to examine early life risk factors for obesity.

#### T-P-3233

##### Development and Validation of the Weight Management Practices Scale

Gigi Shamaley *Las Cruces NM*, Joe Tomaka *Las Cruces New Mexico*

**Background:** The latest Food and Health Survey (2012) found 80% of Americans actively trying to manage their weight, with 55% trying to lose and 22% trying to maintain. This 80% is a diverse group that includes overweight people trying to shed pounds, healthy weight people working to maintain weight and under- or healthy weight people trying to increase muscle mass or suffering from disordered eating. Weight management practices are numerous and include, reducing intake of foods, increasing physical activity, use of diet aids, or practicing the latest fad diet. Although, instruments for assessment of eating

disorders exist, there is no reliable and valid way to assess the range of behaviors employed for managing weight in more general samples. Accordingly, we report on the development and validation of the Weight Management Practices Scale (WMP), for the general assessment of weight management behaviors.

**Methods:** Students at two universities completed instruments for course credit, including items for the WMP and multiple other scales. Study 1 (N = 238) provided data for exploratory factor analyses; whereas Studies 2 (N = 439) and 3 (N = 500) provided data for confirmatory analysis of factor structure.

**Results:** Study 1 suggested nine factors and the confirmatory studies showed good overall fit (CFI = .887 and .929, RMSEA = .065 and .053, respectively). Levels of internal consistency were acceptable (all alpha > .70) and consistent correlations with similar measures

**Conclusions:** The WMP scale offers a valid and reliable alternative to single item indicators for the comprehensive assessment of weight management practices.

#### T-P-3234

##### Development of a Measure of Mindful Eating for Adolescents and Young Adults

Kendrin Sonneville *Ann Arbor Michigan*, Allegra Spalding *Boston MA*

**Background:** Mindful eating has received attention as a promising weight control strategy, however research on mindful eating among non-adult samples is limited and tools which measure the presence or absence of mindful eating skills among adolescents and young adults (AYA) are not available.

**Methods:** We adapted an existing adult measure of mindful eating to include language appropriate for an AYA audience. We then conducted cognitive interviews with 20 male and female AYA (ages 14-24) to evaluate whether questions were clear and similarly understood among participants. We adapted/generated questions based on findings from the cognitive interviews to generate a 21-item pool which we administered to a clinical sample of AYA (ages 12-25) at Boston Children's Hospital with BMIs ranging from underweight through severely obese (mean [SE] BMI: 26.8 [7.4], range: 16.9-64.1). We eliminated items with a highly skewed distributions, examined internal consistency, and conducted an exploratory factor analysis.

**Results:** A factor analysis of responses from 141 participants suggested the creation of a 14-item scale with 3 subscales (eating in the absence of hunger, lack of awareness while eating, distraction). An internal consistency analysis of the 14-item scale showed a Cronbach's alpha of 0.703. Two of the subscales showed good internal consistency (eating in the absence of hunger:  $\alpha = 0.828$ ; lack of awareness while eating:  $\alpha = 0.829$ ), while the distraction subscale had acceptable internal consistency ( $\alpha = 0.655$ ). Scores from the 14-item scale (higher item scores represent lower mindful eating skills) were correlated with BMI in the sample ( $-0.313, p < .001$ ), as were scores on the distraction subscale ( $-0.449, p < .001$ ).

**Conclusions:** Initial development of a measure of mindful eating for AYA resulted in a 14-item measure with good internal consistency. Ongoing psychometric testing of the new measure is needed to establish validity and test-retest reliability.

#### T-P-3235

##### Differences in Weight Classification and Dangerous Implications for Critically Ill Children

Shan Ward *San Francisco California*, Heidi Flori *Oakland CA*

**Background:** Several studies have associated childhood obesity with longer hospital stays and increased infection rates. Acute Respiratory Distress Syndrome (ARDS), a disease with a high mortality rate of 22% in children, often represents the most critically ill children in the Pediatric Intensive Care Unit (PICU). The two interventions proven to reduce mortality, namely antibiotics and low tidal volume ventilation, greatly depend on weight and body mass. Our aim is to understand the prevalence of obesity in the PICU and create a cohesive and accurate obesity definition to standardize care and research methodology.

**Methods:** Five previous multicenter studies (2 clinical trials, 3 observational) were combined to create a cohort of 711 children admitted to the PICU with ARDS. Subjects older than 2 years were included and classified based on CDC z-score criteria ( $< -1.89$  = underweight,  $-1.89$  to  $+1.04$  = normal weight,  $+1.05$  to  $+1.64$  = overweight,  $\geq 1.65$  = obese) and WHO criteria (for ages  $< 5$  years:  $< -2$  = underweight,  $-2$  to  $+1.99$  = normal weight,  $+2$  to  $+2.99$  = overweight,  $\geq 3$  = obese; for ages  $\geq 5$  years:  $< -2$  = underweight,  $-2$  to  $+0.99$  = normal weight,  $+1$  to  $+1.99$  = overweight,  $\geq 2$  = obese). We compared the prevalence of each BMI category as defined by CDC vs. WHO criteria with chi square analysis.

**Results:** 331 subjects were older than 2 years and included in the analysis. By CDC criteria 12% were underweight, 49.9% were normal weight, 10.6% were overweight, and 27.5% were obese. By WHO criteria 11.8% were underweight, 52.9% were normal weight, 19.3% were overweight, and 16% were obese. The categorization differences between the CDC and WHO definitions were statistically significant ( $p < 0.0001$ ).

**Conclusions:** The prevalence of obesity in critically ill children remains shockingly high. With many critical interventions being dependent on weight characteristics, it is imperative that we formulate an accurate, uniform measurement of weight classification to enhance the quality of both clinical care and research these patients.

#### T-P-3236

##### Disparate Weight Gain Associations with Self-Selected and Randomly Assigned Food Consumption in Mice: Can One Confidently Infer Causality from Even the Ultimately Well-Conducted Observational Study?

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**Background:** Establishing cause and effect relationships between outcome and exposure variables is a key goal in biomedical and behavioral research. Randomized experiments are the "gold standard" to establish such relationships, but are sometimes impractical. We conduct an animal study to evaluate whether an observational study which is rigorously controlled and executed beyond any human epidemiologic observational study will find the same causal effect as would a corresponding randomized experiment.

**Methods:** Sixty singly housed, eight-week-old male mice (CD1) were randomly divided into 30 pairs for a two-week feeding regimen. Within each pair, one animal was randomly

assigned to be in a self-selection group (S) where the animals could choose how much of some food they ate; and the other animal was in a randomization (R) group where the animals were fed with the same diet that their randomly assigned S-partners ate the day before. Within the S group alone, we have an observational study of the association of self-selected levels of food with weight gain; while within the R group alone, we have an experimental study on the causal effect of randomly assigned levels of food on weight gain. Linear regression models evaluated the association of food consumption with weight gain in each group.

**Results:** For animals in S group, total food consumption is significantly associated with weight gain after two weeks ( $P=0.001$ ), conditioning on baseline body weight. However, there is no significant effect of total food consumption on weight gain detected for the animals in R group. There is a significant group-by-food consumption interaction for the association between weight gains and total food consumption ( $P=0.002$ ).

**Conclusions:** The disparate results of the observational association estimates and the experimental effect estimates indicate that even the most meticulously controlled observational study, which can hardly be applied to human beings, cannot reliably be counted upon to estimate causal effects.

#### T-P-3237

##### Establishment of Gestation Weight Gain Reference Percentile Curves in Chinese Pregnant with Health Delivery Outcome by LMS Method

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**Background:** To construct growth centile curves of gestation weight gain (GWG) based on longitudinal data from a representative healthy pregnant women with low/normal/high pre-pregnant BMI in Shanghai.

**Methods:** A retrospective data of 2992 healthy pregnant women was selected from antenatal clinics in urban regions in Shanghai. Serial anthropometric measurements were made at every antenatal visit and in the last prenatal control. Healthy pregnant women were defined as 1) pre-pregnant weight was recorded; 2) fasting glucose at 2nd trimester  $<5.6$  mmol/L; 3) without adverse maternal or neonatal complications, such as gestational diabetes, fetal distress, low birthweight ( $<2500$ g), preterm, or macrosomia; 4) Apgar scores in 1 min and 5 min was above 9. Centile curves of body weight by gestational age were developed using the LMS method for low (pre-pregnancy BMI  $<18.5$  kg/m<sup>2</sup>), normal (pre-pregnancy BMI  $>18.5$  kg/m<sup>2</sup> and  $<24$  kg/m<sup>2</sup>) and high BMI-group (pre-pregnancy BMI  $>24$  kg/m<sup>2</sup>) respectively.

**Results:** Centile curves of weight gain for the three groups were in similar shape. Mean weight gain at 38 weeks of gestation was 15.64 kg in low- ( $n=666$ ), 16.05 kg in normal- ( $n=2109$ ) and 14.9 kg in high-BMI group ( $n=217$ ). In normal-BMI group, weight values of the 5th and 95th centiles were 48.6 kg and 61.4 kg at pre-pregnancy, 55.4 kg and 70.9 at 24 weeks, and 62.5 kg and 79.8 at 38 weeks, respectively. The 10% low-, 25.5% normal- and 44.7% high-BMI group exceeded the IOM recommended GWG.

**Conclusions:** Considerable proportion of Chinese pregnant women have excessive GWG according to IOM recommendation even with normal delivery outcomes. Those curves are first weight gain reference percentile curves for

Chinese pregnant women and could help in improving pregnancy weight management.

#### T-P-3238

##### Estimating Adiposity in Children Using Both BMI-for-Age Z-Scores and Quantitative Nuclear Magnetic Resonance

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**Background:** Anthropometric measures and BMI-for-age Z-scores (BMIZ) are commonly used to estimate adiposity in children in clinical practice. In research settings, measures of adiposity are better estimated using air displacement plethysmography, dual energy X-ray absorptiometry or quantitative nuclear magnetic resonance (qNMR). The latter has been previously standardized for repeated measures throughout infancy and childhood and does not expose the participants to radiation. In the present report, we compared BMIZ and qNMR fat mass results in children age 2 to 60 months.

**Methods:** 552 children (283 boys and 269 girls) from two separate cohorts (Beginnings and Glowing) were assessed at 2, 3, 6, 9, 12, 24, 36, 48 and 60 months using standardized anthropometric measures and qNMR (EchoMRI-AHTM, Echo Medical Systems). A total of 2,189 scans were performed and BMIZ were calculated using WHO software.

**Results:** Children were mostly Caucasians (87%), with mean birth weights of  $3.3 \pm 0.4$  kg and mean birth lengths of  $51.0 \pm 2.3$  cm. There were no significant differences in percent fat mass estimates related to behavior during the measurements (calm or crying). BMIZ were significantly correlated with fat mass, percent fat mass and fat free mass at each age ( $P<0.001$ ). The weakest correlations were seen at 6 months ( $r=0.711$ ,  $0.569$ , and  $0.376$ , respectively) and the highest were seen at 60 months ( $r=0.806$ ,  $0.664$  and  $0.583$ , respectively). The variance of fat mass percentage varied considerably by age and BMIZ. In our sample, the lowest variance observed was 4.2 for BMIZ  $=2$  at 3 months and the highest variance observed was 48.4 BMIZ  $=2$  at 48 months.

**Conclusions:** While BMIZ is highly and significantly correlated with measures of adiposity obtained by qNMR, the variance of percent fat mass for each BMIZ category is very high. These data suggest that predictive models using clinical parameters would improve clinicians' evaluation of children's adiposity rather than relying solely on BMIZ.

#### T-P-3239

##### Evaluation of a Novel Bluetooth Bioimpedance Analysis Device Designed for mHealth Applications

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**Background:** Body fat and skeletal muscle mass measurement is of increasing interest in the clinical setting and to the general public. The aim of the current study was to evaluate the feasibility of developing a small portable wireless contact-electrode Bioimpedance Analysis (BIA) system designed for personal body composition analysis.

**Methods:** A hand-held multifrequency device was evaluated that included two electrode configurations (palm-to-palm [PP] and finger-finger [FF]). Impedance (Z) values derived by the device at Pennington Biomedical Research and Samsung Medical Centers were evaluated against corresponding electrical pathways measured using a gel-electrode reference multifrequency BIA system (InBodyS10 [IB], Seoul, South Korea) in 532 (224 M, 308 F) healthy white (82 M, 132 F), black (21 M, 52 F), and Asian (121 M, 124 F) adults ranging widely in body mass index. Additionally, the main traditional lean soft tissue mass (LST) and fat-predictor variable height<sup>2</sup>/Z was examined relative to LST evaluated with dual-energy X-ray absorptiometry (DXA; GE Lunar Prodigy, Madison, WI).

**Results:** There were strong correlations between the two prototype pathways at 50 KHz and corresponding IB arm-arm electrical pathway (R<sub>2</sub>, 0.80-0.90, p<0.0001). There was a significant sex covariate in models predicting LST from Height<sup>2</sup>/Z and age within each ethnic group. Sex-specific models were additionally developed that included significant race covariates. LST prediction models based on height<sup>2</sup>/Z, age, and race for the PP and FF pathways had similar magnitude correlations (R<sub>2</sub>, 0.79 and 0.73) as that observed for the IB reference system (0.80; all p<0.001).

**Conclusions:** The novel evaluated BIA system as a small form factor mobile device thus shows promise as a means of quantifying an individual's body composition and predicting percentage fat without body weight measurement.

#### T-P-3240-DT

##### **External Validation of Equations to Predict Percentage Body Fat Using Demographic and Anthropometric Measurements: NHANES 1999-2006 and CARDIA 1995-1996**

Kamika Reynolds *Chapel Hill North Carolina*, June Stevens *Chapel Hill North Carolina*, Christina Shay, Cora Lewis *Birmingham AL*

**Background:** Assessment of percent body fat (%BF) by highly precise methods such as Dual-emission X-ray absorptiometry (DXA) is often not feasible. Recently, Stevens et al. developed gender-specific equations to predict %BF using data from NHANES 1999-2006. The purpose of this study is to evaluate their external validity in a population-based, racially-diverse, young adult cohort.

**Methods:** Data were from 392, 28-40 year old black and white men and women who participated in the Coronary Artery Risk Development in Young Adults (CARDIA) 1995-96 exam. Variables assessed in CARDIA included demographics, height, weight, waist and arm circumferences, and triceps and subscapular skinfolds. These variables were used in gender-specific equations to predict %BF, which we then compared to observed values measured by DXA in the CARDIA participants.

**Results:** Overall, the predicted and observed %BF values were strongly associated, although the R-squared values (0.71 in men and 0.77 in women) were lower than those from the internal validation in NHANES (0.84 in men and 0.80 in women). R-squared estimates from the external validation were very similar to those from internal validation in white and black women (differences 0.02 and -0.05, respectively), but were lower in white and black men (-0.19, -0.10, respectively). Mean Signed Differences (MSD) indicated that bias was low (within +/- 1 % BF) in white men and women, but mean %BF was significantly overestimated by 1.2

percentage points in black men (2% of mean %BF) and underestimated by 1.4 percentage points in black women (4% of mean %BF).

**Conclusions:** This was the first study to evaluate the external validity of equations for prediction of %BF recently developed in the NHANES data. Our results suggest that the equations are applicable to an independent sample and provide a reasonable method for assessment of % BF when more precise methods are not feasible.

#### T-P-3241 - Withdrawn

#### T-P-3242

##### **Low level plasma free essential amino acids as a potential risk factor for obesity and brain infarction**

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**Background:** We previously reported that plasma free amino acid (PFAA) profiles were closely associated with future development of metabolic syndrome and related diseases. Among them, essential amino acids (EAAs) are possible target for preventive intervention by diet to control the plasma level. However, only poor information is available both for adequate plasma levels of EAAs.

**Methods:** PFAAs were quantified in total of 7,685 Japanese subjects using liquid chromatography - mass spectrometry. Among them, 3885 subjects were chosen as reference individuals based on exclusion criteria. Box - Cox transformation coefficient were estimated in each plasma EAA level of reference individuals with stratification by gender. Using coefficients, plasma EAA levels of 4,297 Japanese cohorts were normalized. This cohorts were followed-up for four years after baseline examination, and using each normalized plasma level of EAA as explanatory variable, logistic regression analysis was conducted to estimate age-, gender-, and BMI- conditioned risk of obesity (Ob) or brain infarction (BI).

**Results:** Among 4,297 Japanese cohorts, 14.5% subjects that one or more than plasma EAA levels were lower than average by >2SD were observed and it was also suggested that those subjects were at risk for malnutrition. By means of logistic regression analysis, significant elevation of risk for Ob and BI was detected in the subpopulations in whom low level plasma EAA was observed. Low plasma level of arginine, lysine, methionine, or threonine caused elevation of risk for Ob, and that of histidine, methionine, or phenylalanine caused elevation of risk for BI, respectively.

**Conclusions:** Since EAAs are ingested only via diet, these results described above suggest that under-ingestion of EAAs caused Ob and BI. Therefore adequate ingestion of dietary EAAs may prevent future onset of these symptoms.

#### T-P-3243

##### **More Than the Mean: Reviewing Regression Methods that Take a Wider View of the Association between BMI and SES**

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**Background:** The inverse association between body mass index (BMI) and socioeconomic status (SES) in wealthy countries has been established, in part, through analytic methods that model the conditional expectation (mean) of a dependent variable as a function of one or more predictor variables. These methods may lead researchers to overlook important variations in the association between SES (and other variables of interest) and BMI which may provide insight into the causal mechanisms generating the association. We review four methods available to analyze the association between BMI and other variables at locations in the distribution of BMI other than the mean: multinomial logistic regression, continuation-ratio logistic regression, conditional quantile regression, and unconditional quantile regression.

**Methods:** Using data from the 2006-2008 Health and Retirement Study, we estimate the association between BMI calculated from technician-measured height and weight and three standard indicators of SES: education, household income, and household wealth. For comparison, we first estimate the association between BMI and SES using standard linear regression (OLS). We then estimate the association using the four techniques which model something other than the conditional mean function of BMI.

**Results:** The association between BMI and SES varies by level of BMI, indicating that a focus on the conditional mean can overlook important information. For example, results from the continuation ratio model indicate that among females, education is significantly associated with a reduced likelihood of advancing to a higher weight among those that are normal weight or overweight, but not among obese women.

**Conclusions:** Researchers have several options to choose from when estimating an association between BMI and other variables, many of which do not model the conditional mean of BMI. These methods can offer a more nuanced view of the association between BMI and SES, as well as other variables of interest.

#### T-P-3244

##### Normal Weight Obesity and Disability in Older Adults: Data from NHANES 1999-2004

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**Background:** Current body mass index (BMI) strata likely misrepresent the accuracy of true adiposity in elders. Subjects with normal BMI and elevated body fat (normal weight obesity (NWO)) are at higher metabolic risk, but the relationship with function in older adults is unclear.

**Methods:** Subjects aged  $\geq 60$  years with a BMI 18.5-25 kg/m<sup>2</sup> with dual-energy X-ray absorptiometry measures from National Health and Nutrition Examination Surveys 1999-2004 were included. We defined NWO as subjects with a normal BMI and high body fat (men >25%; females >35%). Data on physical limitations (PL), instrumental activities of daily living (ADL)s and basic ADLs were abstracted. Comparative rates were assessed among subjects with a normal BMI and high/low percent fat. We created sex-specific multivariate logistic regression models adjusting for age, race, smoking, comorbidity, and appendicular lean mass (ALM).

**Results:** We included 1,304 subjects (52.1% female, 66.9% with NWO). Mean age was 72.3 years. ALM was higher in NWO in men than women (20.2 vs. 13.7 kg;  $p < 0.001$ ). In males with and without NWO, rates of PL were 41.6 vs. 34.4% ( $p = 0.23$ ), instrumental ADLs were 25.3 vs. 20.5% ( $p = 0.24$ ),

and basic ADLs were 34.2 vs. 33.1% ( $p = 0.84$ ). In females with and without NWO rates of PL were 55.1 vs. 50.6% ( $p = 0.005$ ), instrumental ADLs were 61.2 vs. 62.0% ( $p = 0.002$ ), and basic ADLs were 44.7 vs. 43.0% ( $p = 0.01$ ). For PL, NWO was associated with OR 1.20 [0.73, 1.97] in men, and 1.41 [0.83, 2.40] in females. Adjusting for ALM reduced the magnitude of the estimates (1.08 [0.65, 1.78] and 1.31 [0.77, 2.24]). We found OR 0.87 [0.53, 1.44] and OR 1.23 [0.81, 1.88] in men and women for basic ADLs, and OR 0.87 [0.53, 1.44] and 0.89 [0.54, 1.46] for instrumental ADLs. Reduced estimates were observed after adjusting for ALM. **Conclusions:** While elders with NWO have increased cardiometabolic dysregulation, our results suggest no increased association with functional impairments. ALM attenuates the magnitude of results proving the importance of the muscle-adipose interplay

#### T-P-3245

##### Personalized Indirect Calorimeter for Energy Expenditure (EE) measurement and use under free-living conditions

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**Background:** A personal indirect calorimeter allows everyone to assess resting energy expenditure, thus enabling accurate determination of a person's total calorie need for weight management and fitness. The aim of this study is to: 1- compare the performance of a new personal metabolic rate tracker based on indirect calorimetry, Breezing®, with the Douglas bag method, the gold standard method for energy expenditure (EE) measurement, 2- present study cases, using the tracker

**Methods:** Energy expenditures (EE) at rest and during activities, and respiratory quotient (RQ) were measured for 12 healthy subjects, including 7 males and 5 females under different living conditions. A total of 314 measurements were performed with Breezing®, and the results were compared with those by the Douglas bag method. In addition, study cases for hormonal disorder, pregnancy, weight loss, and exercise are presented.

**Results:** R-squared correlation coefficients (R<sup>2</sup>) between the data obtained with Breezing® and the Douglas bag method were 0.9976, 0.9986, 0.9981, and 0.9980, for VO<sub>2</sub>, VCO<sub>2</sub>, EE, and RQ respectively. The study cases demonstrated the scientific value of the tracker use under free-living conditions, bringing new insights about the individual's physiology, and effects of interventions, including drug treatment, diet, and exercise.

**Conclusions:** The EE and RQ values determined by Breezing® are in good agreement with those by the Douglas bag method. The use of a mobile metabolic rate tracker in free-living conditions brings more information to professionals. The information collected by the individuals at home, and shared with the professionals increases the precision of the individual's health assessment, and therefore, the intervention practices can become more efficient.

#### T-P-3246-DT

##### Social Determinants of the Racial Disparity in Obesity: Does a Nonlinear Effect for Street Connectivity Explain Part of the Relationship

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**Background:** A disparity in obesity rates between whites and blacks exists in the US. Aspects of the built environment are implicated despite complex relationships for critical variables like walkability. Analyses that relax the linear assumptions between the outcome and predictors are needed.

**Methods:** Mediation analyses of NHANES 2003-2006 participants (n=4,401) using Multivariate Additive Regressive Trees (MART) for the relationship between race and obesity risk (BMI>30) were conducted. A variety of individual (e.g., age, race, physical activity) and contextual (i.e., population density, street connectivity, unhealthy food outlets, crime, concentrated disadvantage (CDI), poverty) variables were included. Three measures of street connectivity were jointly considered given the complex nature of the relationship. Variables with significant associations with obesity were included in the final MART analysis with logit link exploring indirect (i.e., mediating) effects.

**Results:** Among the contextual variables only the CDI ( $\beta=0.11$ ; SE=0.03) and the joint effect of the street connectivity measure ( $\beta=0.05$ ; SE=0.02) had significant effects, accounting for 20.4% and 9.26% of the disparity, respectively. Blacks tend to live in neighborhoods characterized by higher street connectivity, which should reduce not explain the disparity, so result was unexpected. MART analyses explained this in terms of nonlinear relations for the marginal effect of two of the three street connectivity measures. Risk of obesity declined in the lower range of connectivity scores, after which risk increased and then plateaued.

**Conclusions:** The findings suggest a complex relationship between street connectivity and obesity risk and its potential mediating effect on the black-white disparity in obesity. The findings suggest that for some measures of street connectivity risk of obesity increases at the higher levels. Consequently, the tendency for blacks to reside in city centers may explain the disparity in obesity risk.

#### T-P-3247

##### The Interactions Between Ghrelin and Inflammation May Predict Mortality in Hemodialysis Patients

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**Background:** Ghrelin, a gastric orexogenic peptide, has been shown to link mortality risk in hemodialysis (HD) patients with protein-energy wasting (PEW). We hypothesized that the association of low ghrelin with chronic inflammation may potentiate the mortality risk in HD patients.

**Methods:** We investigated the interactions between inflammatory biomarkers (IL-6 and TNF- $\alpha$ ) and ghrelin as predictors of death over a 3 years of follow-up (median - 28 months, interquartile range - 17-34 months) in 261 maintenance HD patients (39% women, mean age of 68.6 $\pm$ 13.6 years).

**Results:** During follow-up 109 patients died, including 51 from cardiovascular causes. A significant interaction effect of low ghrelin (defined as a level less than median) and high IL-6 (defined as a level higher than median) on all-cause and cardiovascular mortality was found: crude Cox hazard ratios (HR) for the product termed Ghrelin x IL-6 were 1.65, with a 95% confidence interval (CI): 1.04 to 2.63 (P=0.04) and 2.88, with a 95% CI: 1.48-5.59 (P=0.002), respectively. Compared to patients from other ghrelin-IL-6 categorized groups, patients in the low-ghrelin-high IL-6 group were predominantly males,

with higher incidence of diabetes, had higher BMI, comorbidity index and lower Kt/V levels. These variables consequently were inserted in all multivariable models. Across the four ghrelin-IL-6 categories, the group with low ghrelin and high IL-6 exhibited the worse outcome in both all-cause and cardiovascular mortality (multivariable adjusted hazard ratios were 1.81, 95% CI 1.04 to 3.14, and 3.04, 95% CI 1.25 to 7.39, respectively).

**Conclusions:** Low ghrelin levels augment the effect of inflammation on all-cause and cardiovascular death in hemodialysis patients.

#### T-P-3248

##### Understanding the Unmet Healthcare Needs of Patients with Obesity Using the Experience Group Research Tool

Scott Wallace *Hanover NH*, Deborah Kennedy *Lebanon NH*, Karen Huyck *Lebanon NH*, Cathleen Beaver *Hanover New Hampshire*, John Batsis *Lebanon NH*, Richard Rothstein *Lebanon NH*

**Background:** Not addressing needs and experiences of patients limits the effectiveness of treatment of chronic disease. Experience Groups (EG) is an innovative qualitative research method for identifying unmet patient needs to improve care. Unlike focus groups that test existing or planned products or services, EG help create new healthcare solutions. The EG technique has been applied successfully to many chronic diseases but not obesity.

**Methods:** To understand unaddressed needs and obstacles to better health related to obesity, we conducted three 90-minute EG sessions comprised of four to seven participants. Participants were enrolled through newspaper ads seeking individuals interested in discussing weight and improved health. All sessions were led by a co-creator of EG and followed the EG protocol. Discussions from each session were analyzed to identify categories of patients and patterns of unmet needs.

**Results:** Four categories of patients were identified and assigned a casual name to describe shared characteristics: (1) Accelerated Agers expressed distress that their quality of remaining life would be diminished by obesity, (2) the Psychologically Obstructed described long-standing psychological pain, (3) the Medically Challenged described serious long-term health challenges that prevented successful weight management, and (4) the Intrinsically Motivated were succeeding in a current weight loss effort. Improved function and quality of life were the primary goals among all participants.

**Conclusions:** The variation in the needs of patients with obesity suggests that multiple care approaches to weight management are needed. Moreover, many physiological, psychological, and lifestyle goals identified by EG participants could be achievable without weight loss. Further defining subgroups of patients with obesity and addressing their unmet needs through innovative healthcare solutions is critical for improving patient outcomes and decreasing the cost of obesity-related care.

#### T-P-3249

Usefulness of visceral fat mass measurement by DXA  
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**Background:** Visceral adipose tissue (VAT) was associated with adverse health effects including cardiovascular disease and diabetes. We evaluated the usefulness of VAT measurement in predicting the diabetes, comparing with waist circumference.

**Methods:** The data from Korea National Health and Nutrition Examination Survey (2009) 4,431 subjects (aged over 20 years old and without type 2 diabetes) were analyzed. Insulin resistance was measured by the homeostasis model assessment of insulin resistance.

**Results:** HOMA-IR also had positive correlated with DXA-VAT (men:  $r=0.255$ ,  $p<0.001$ ; women:  $r=0.237$ ,  $p<0.001$ ). According to regression between HOMA-IR and DXA-VAT, HOMA-IR value 2 is matched with 101 cm<sup>2</sup> (men) and 86 cm<sup>2</sup> (women). Conventional waist circumference reference value was associated with 1.5 times (men,  $p<0.001$ ) and 1.9 times (women,  $p<0.001$ ) of increasing diabetes risk. However, DXA-VAT reference (matched with HOMA-IR =2) was associated with 2.4 times (men,  $p<0.001$ ) and 2.5 times (women,  $p<0.001$ ) of increasing diabetes risk.

**Conclusions:** DAX-VAT is useful method to predict the risk of diabetes. Comparing with waist circumference, DXA-VAT was respected to superior than waist circumference.

#### T-P-3250-DT

##### Validation of the Snack and Sugar-Sweetened Beverage Categories of a Home Food Availability Checklist among White British and Pakistani homes in the UK

Madison LeCroy *Chapel Hill NC*, Maria Bryant *Leeds West Yorks*, Jianwen Cai *Chapel Hill NC*, June Stevens *Chapel Hill North Carolina*

**Background:** Despite the number of available tools to assess home food availability, none have been validated against direct observation in populations outside of the USA. The purpose of this study is to evaluate the criterion validity of the snack and sugar-sweetened beverage (SSB) categories of a home food availability checklist within a multi-ethnic cohort in the UK.

**Methods:** An opportunistic sample of 100 families with infants approximately 18 months old was selected from the Born in Bradford 1000 birth cohort. Participants completed a checklist on the maximum availability of foods in their homes within predefined categories over the previous 7 days. Responses were compared to gold-standard researcher-conducted open inventories on the availability of foods within the checklist-specified categories on the single day of observation. Item-specific sensitivity, specificity, and prevalence- and bias-adjusted kappa coefficients (PABAK) were calculated using dichotomized responses (presence/absence) for each item.

**Results:** A total of 97 inventories were completed, 47% in White British homes and 42% in Pakistani homes. Among the snacks (7 items) and SSBs (3 items), PABAKs ranged from 0.15 to 0.72 (mean = 0.41) and from 0.06 to 0.66 (mean = 0.39), respectively. PABAKs differed by  $\geq 0.40$  between ethnicities for two snacks (salted nuts and chocolate) and for one SSB (sports drinks). Sensitivity ranged from 0.77 to 1.00 for snacks and from 0.67 to 0.84 for SSBs. Specificity ranged from 0.24 to 0.70 for snacks and from 0.46 to 0.84 for SSBs.

**Conclusions:** Compared to previous criterion validations of snack and SSB categories of home food availability self-report assessment tools, this checklist performed slightly below average. These results indicate that the agreement between the home food availability checklist and the researcher-conducted

inventory is fair to moderate on average for snacks and SSBs and may be associated with participant ethnicity.

#### T-P-3251

##### Visceral Adipose Tissue Accumulates Rapidly When Percent Body Fat Exceeds 30% in Women and 16% in Men Aged 18-59 Years

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**Background:** Greater visceral adipose tissue (VAT) is associated with cardiometabolic risk, independent of total fat mass and subcutaneous fat. It was recently suggested that VAT does not accumulate linearly as percent body fat (PBF) increases, but rather that there are sex-specific, biological thresholds of total body fatness, below which VAT accumulation is minimal, and above which VAT tends to rapidly increase. Replication of such thresholds would provide a useful target defining "safer" levels of total body fatness. The present analysis tests the cut-point (CP) hypothesis in a cross-sectional sample of 1,251 healthy White and African-American adults (546 males, 706 females; 134 African-Americans) aged 18-59 yrs (mean age  $39.2 \pm 12.5$  yrs) from three studies examining the relationship of ectopic fat accumulation to cardiovascular risk.

**Methods:** PBF was determined using dual energy x-ray absorptiometry (DXA) from a Hologic QDR 4500 Elite X-ray densitometer (Hologic, Bedford, MA). VAT was assessed using multiple-image MRI (Siemens Magnetom Vision 1.5-T, Mississauga, Canada), and using a T1-weighted fast-spin echo pulse sequence. Images were obtained every 10-mm from the T9 vertebra to the S1 vertebra. Change-point modeling in SAS Version 9.4 using PROC MCMC identified PBF CPs, adjusted for age, race, and in women, menopause status, above which VAT accumulation significantly increased, using mixing, autocorrelation and posterior density plots to confirm model adequacy. Piecewise regression was then used to calculate the VAT slope below and above the CP defined in the change-point model.

**Results:** Among females, VAT increased systematically above 30% (below:  $\beta=0.035$ ,  $SE=0.007$ ; above:  $\beta=0.136$ ,  $SE=0.008$ ). Among males, VAT increased above 16% (below:  $\beta=0.135$ ,  $SE=0.019$ ; above:  $\beta=0.242$ ,  $SE=0.013$ ).

**Conclusions:** This study supports a target 30% body fat or lower in women and 16% or less in men 18-59 yrs of age for reduction of VAT accrual.

#### T-P-3252-DT

##### Waist Circumference in Children Increases Despite Weight Stabilization

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**Background:** National data from the United States has shown weight stabilization in children in the past decade. However, weight stabilization does not necessarily reflect potential changes in body composition. Through comparisons with data reported in 2004, this study identified changes in WC percentiles across a decade in children and adolescents of African-American (AA), European-American (EA) and Mexican-American ethnic backgrounds

**Methods:** Data from the National Health and Nutrition

Examination Survey (NHANES) from 2005 – 2012 was used to evaluate WC measured at the right iliac crest among non-institutionalized US children and adolescents self-classified as AA (n=3498), EA (n=3686) and MA (n=3549). Percentile regression was used to model the regression lines of the 10th, 25th, 50th, 75th, 85th, 90th and 95th percentiles of the distribution of WC according to race/ethnicity and sex for age 2 - 18. Descriptive trends in WC percentile distributions across time were identified by comparing present study data with previously reported (2004) data for boys and girls at every age within ethnic group.

**Results:** WC increased in a monotonic fashion in all children with significant differences in the slope trajectory across age among AA, EA and MA boys and girls. When changes across a decade were evaluated, a clear left shift of percentile categories was observed such that values that used to be in the 90th percentile are now in the 85th percentile. AA and MA girls exceeded the WC cutoff value for obesity-related disease risk in adults at as early as 11 years of age.

**Conclusions:** WC has increased in the past decade in the US pediatric population. Given that no increase in the prevalence of pediatric obesity in the US has been reported, our data raises the potential concern of having stable-weight children with a distribution of body composition that places them at risk of disease.

#### T-P-3253

##### **Why are Men Uninterested in Weight Loss? : Crowdsourcing Provides a Unique Approach to Understand Why**

Tiffany Rounds *Burlington VT*, Josh Bongard *Burlington VT*, Paul Hines *Burlington VT*, Fritz Davenport *Burlington Vermont*, Jean Harvey *Burlington VT*

**Background:** Men are less likely to participate in obesity treatment interventions, are less likely to engage fully when they do and often fail to lose clinically significant amounts of weight. There is a need to identify evidence-based approaches that actively engage men in initial weight loss and successful maintenance. Internet-based research is a low-cost, efficient way to produce novel hypotheses related to weight loss that have previously escaped weight loss professionals. The purpose of this study was to facilitate intervention development by using crowdsourcing to detect unexpected beliefs and unpredicted barriers to male weight loss.

**Methods:** Participants were recruited to a crowdsourcing survey website where they reported their gender and BMI. Users then responded to questions that were likely to help predict their BMI and also proposed new questions thought to be related to the outcome of interest. Other users subsequently answered these new questions. Over 2 weeks, 522 users joined the website and proposed 192 questions. 188 were approved and added to the survey.

**Results:** Participants provided 21,846 responses to 193 questions. Correlations were calculated between users' reported BMI and question responses to establish associations between the crowd-sourced questions and BMI. Spearman and Pearson correlations were calculated for categorical questions, and numerical and ordinal questions, respectively. 54 questions significantly correlated with BMI ( $p < 0.05$ ), 33 of which were significant to  $p < 0.01$ . While several common themes seen in prior research were revealed such as previous health diagnoses and physical activity participation, other potential weight determinants such as dietary habits, sexual behaviors and self-perception were reported.

**Conclusions:** Crowdsourcing in this context provides a mechanism to further investigate perceptions of weight and weight loss interventions in the male population that have not previously been documented. These insights will help guide future intervention design.