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2016 SUBMITTED ABSTRACTS

ORAL PRESENTATIONS

RESOLUTION OF SEVERE GASTRIC DYSMOTILITY DISORDER (SGDD) WITH ACUPUNCTURE

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Background: Patients with SGDD may require parenteral nutrition or jejunostomy feeding. They often need gastrostomy drainage tubes for discharge. Few medical options exist for management. We were recently surprised by the beneficial effect of acupuncture in a case of SGD, which we present herein.

Case report: A 68 year old male underwent a Whipple procedure for malignant pancreatic neoplasm. He had persistent nausea and vomiting, postoperative abscess and high nasogastric tube output. He was assessed to have SGDD which required discharge on home TPN and gastrostomy drainage. He had gastric fluid outputs of ~2,000 ml/d in the hospital which persisted after discharge. Manual acupuncture at the stomach meridian (ST-36) was performed on post-discharge day 3. The following day, daily gastrostomy drainage declined from 2,000 ml to <100. Later the same day, had his first post discharge bowel movement and began a liquid diet. His stomach capacity returned to normal, and he eventually returned to a regular diet consistency and volume. His weight and nutritional parameters remained stable and he was weaned off TPN.

Discussion: We were surprised by the rapid benefit of acupuncture on this patient's SGDD. Traditional methods including gastric motility agents and surgery had failed. Evidence exists that acupuncture may involve excitation of vagus nerve, serotonergic pathways, opiodergic pathways and spinal or supra-spinal reflexes. Acupuncture is used for different diseases of GI tract such as anti-emesis, PUD, non-ulcer dyspepsia, esophageal disease, pancreatic diseases, acute appendicitis, IBD, postop GI dysmotility, constipation, IBS and diarrhea. There are over 300 acupuncture points and selections the points that affect GI track are done based on the different practice styles.

Conclusion: Acupuncture of the stomach meridian may be an important modality for patients with SGDD. This case demonstrates the benefits of considering integrative approach in treatment of GI conditions.

Experiments studies have suggested that acupuncture may involve excitation of vagus nerve, serotonergic pathways, opiodergic pathways and spinal or supra-spinal reflexes (Kim et al). Acupuncture is used for different diseases of GI track such as anti-emesis, PUD, non-ulcer dyspepsia, esophageal disease, pancreatic diseases, acute appendicitis IBD, postop GI dysmotility, constipation, IBS, diarrhea. (Diehl, 1999). There are over 300 acupuncture points and selections the points that affect GI track are done based on the different practice styles (Diehl , 1999).

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A NOVEL MITOCHONDRIAL MYOPATHY (MM) CAUSED BY VARIANT MITOCHONDRIAL DNA (mtDNA)

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Background: MM results from defects in the enzymes of oxidative phosphorylation (OXPHOS), due to abnormal nuclear DNA (nDNA) signaling or defects in mtDNA. In addition to muscle, the classic phenotypes also involve nervous, hepatic and other tissues. MMs can cause disease early in life. But mild cases may go unrecognized into adulthood.

Case report: AR is a 26 year old male referred for episodic rhabdomyolysis with persistent creatine kinase (CK) elevation. He experienced collapse with severe exertion. He had evidence of liver and kidney dysfunction at baseline. His HbA1C was slightly elevated at 5.8%. Carnitine and micronutrient levels were normal. MRI of both thighs did not detect myositis or atrophy. We suspected a metabolic myopathy or glycogen storage disease (GSD) and started a complex carbohydrate, high protein diet with

careful attention to fluid intake. The patient was instructed to avoid heavy exertion. His CK, myoglobin, liver enzymes and renal function all improved with this approach.

Genetic Studies: A rhabdomyolysis genetic sequencing screen was negative for 27 nuclear genes associated with myopathic due to glycogen, lipid or mitochondrial conditions. A mitochondrial genome was submitted and compared to the MITOMAP database. A homoplasmic variant in the cytochrome c oxidase (COX) subunit III (mt-CO3) gene was found at position m.9696 in which thymine was substituted for cytosine. This pathologic variant encodes a defective COX III protein in which phenylalanine is substituted for leucine at position p.164. His mother shares the variant, without apparent symptoms.

Discussion: The patient's rhabdomyolysis is apparently due to defect in OXPHOS caused by a pathologic variant in the gene encoding his COXIII. He is clinically stable unless he undergoes extreme exertion. He has no evidence of neurological, ophthalmologic or cardiac dysfunction but hepatic, renal and endocrine systems may be compromised. This condition appears to represent a novel MM due to a maternally inherited pathologic variant in mtDNA.

The 37 genes of mtDNA encode of the mitochondrial respiratory chain (RC) components, tRNA and rRNA molecules.

A NOVEL FORM OF GLYCOGEN STORAGE DISEASE (GSD) III CAUSED BY A VARIANT GENE

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Background: There are 16 classic GSD phenotypes, caused by genetic defects in glycogen synthesis or degradation in liver, muscle and other cells. Severe forms of GSDs are recognized early in life. However, milder glycogen storage defects may go unrecognized into adulthood.

Case report: JC is a 62 year old female referred for a 15 pound weight gain after chemotherapy for breast cancer. She reported exercise induced muscle cramps and severe exhaustion. A prior workup revealed reactive hypoglycemia, without evidence of insulin resistance. A CT scan of her abdomen was negative for hepatomegaly. Her liver enzymes were not elevated. She had an elevated 24 hour urine creatine excretion (186 mg/24h; repeat = 150; nl = 0-80) with a normal serum creatine (0.7). Her serum (0.77) and urine creatinine (869.6 mg/24h) were normal. The pantothenic acid level was >4 times above the upper limit of normal (7885 ng/ml; nl = 200-1800). We suspected a mild GSD, most likely type VII (phosphofructokinase deficiency) because of the exercise-induced muscle cramps, abnormal muscle biochemistry and the absence of liver abnormalities. She was placed on a complex carbohydrate, high protein diet and carnitine supplementation. Her symptoms of exhaustion, exercise-induced muscle cramps and excess weight all improved significantly.

Genetic Studies: A genetic sequencing screening panel for 21 GSD associated genes identified a heterozygous variant of the AGL gene encoding glycogen debranching enzyme (GDE). There was a single base pair substitution of guanine for adenine at position c.1087. This variant coded for an amino acid substitution in GDE at position p.363 in which arginine replaced glycine.

Discussion: We suspected that this patient had GSD VII based on hypoglycemia, muscle cramping, biochemical muscle dysfunction and the absence of liver disease. Treatment with a complex carbohydrate, high protein diet satisfactorily controlled the symptoms and promoted weight loss. Finding the pathologic genetic variant of AGL changed the diagnosis to GSD III, a disorder of GDE with 4 known subtypes. GSD IIIa involves both liver and muscle. GSD IIIb only liver. GSD IIIc and IIId are solitary deficiencies of the GDE glucosidase and transferase activities, respectively. This patient appears to have a novel GSD III variant which primarily impacts muscle. It is possible that this GDE variant is only problematic with higher energy requirements such as exercise.

NUTRITIONAL SUPPORT IN A PATIENT WITH CYSTIC FIBROSIS AND A TWIN PREGNANCY

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Background: Pregnant patients with Cystic Fibrosis (CF) are at higher overall risk given the nature of their liver disease, pancreatic insufficiency and high nutritional demands to support their increased lung workload. This risk minimizes should they proactively have nutrition support before and during pregnancy as well after pregnancy to reassure their recovery back to their baseline health.

Purpose: Nutrition support is crucial as the needs for nutrition are increased for a patient with CF and even higher during pregnancy and during breastfeeding. Weight gain in normal pregnancy is expected to be 10-12 kg therefore the daily caloric requirement increases to 150 % which may be difficult to achieve without resort to parenteral feeding.

Methods: This is a single case study of a 33 year old patient carrying an in vitro twin pregnancy without initial exacerbation for her CF.

Hospital Course: The patient had reportedly good health and was athletic with no nutritional issues prior hospital admission. At 26 weeks pregnant, patient appeared with what seem to be bilateral lower extremity edema, poor intake and elevated transaminases. Patient had reportedly some fatty liver disease. The patient was treated with ursodeoxycholic acid as the only treatment currently available. During hospital stay patient was maintained on parenteral nutrition (PN) with increased amino acid (AA) intake up to 120 grams of protein, about 150 % of her usual daily needs of protein with increased amount of fluids to support her cystic fibrosis. In

addition, information on microbiology, liver function, vitamin levels and osteoporosis was obtained.

The indication for TPN would be poor nutrition intake, inadequate weight gain, recent weight loss, very low BMI, failure to thrive, hyperemesis gravidarum, intractable nausea and vomiting, and bowel obstruction. The patient successfully delivered twin babies at 29 weeks and 3 days of pregnancy via C section. Her weight loss carefully monitored during and after hospital stay. Her Prealbumin and Albumin levels were checked periodically.

Conclusion: Liver disease is a relatively frequent and early multifactorial complication of cystic fibrosis with contributions from environmental and genetic determinants. Its impact on quality of life is detrimental therefore its early detection and treatment is very important.

There are no guidelines in regards to screening liver before or during pregnancy. CF women of greater age, with poor pulmonary function, inadequate nutrition, are at higher risk for maternal and fetal morbidity and mortality.

THE EFFECT OF WHITE BREAD CONSUMPTION ON OBESITY AND WAIST CIRCUMFERENCE IN JORDAN

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The prevalence of obesity and metabolic syndrome are rapidly increasing in Jordan. There is over consumption of a partially government-subsidized white pita (about 2 slices of toast) bread. The objective of this study was to evaluate the association of white bread (WB) consumption with obesity and/or waist circumference (WC).

Methods: 1100 subjects were enrolled from the 3 largest cities in Jordan following direct observation of white bread purchases at bakeries. The subjects were surveyed for their daily use of WB, potato, rice, sweets, junk food, visible fat in meat, cooking oil, physical activity and measured their weight, height, and WC.

Results: Using ordinal logistic regression and adjusting for covariates, WB use was associated with a higher risk of obesity in women as follows; 2-3 pitas/day, adjusted OR 3.09, 95% CI 1.32, 7.26; $P=0.009$, 4-5 pitas/day, adjusted OR 4.53, 95% CI 1.31, 15.68; $p=0.017$ and with higher risk of abdominal obesity in males, 6-15 pitas/day, adjusted OR 1.82, 95% CI 1.07, 3.09; $P=0.028$ compared with the lowest quartile, ≤ 1 pita/day.

Conclusion: The over consumption of WB may be contributing to the rising obesity prevalence in Jordan.

PHENOLIC AND ANTHOCYANINS FRACTIONS FROM WILD BLUEBERRIES (VACCINIUM ANGUSTIFOLIUM), DIFFERENTIALLY MODULATE ENDOTHELIAL CELL MIGRATION

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Angiogenesis is a normal biological process that occurs in tissue development and is highly linked to wound healing and a plethora of pathological conditions such as atherosclerosis. This study investigates the effect of anthocyanin (ACNs) and phenolic acid (PA)-rich fractions and their combination from wild blueberry powder (*Vaccinium angustifolium*) on endothelial cell migration related to angiogenesis. The objectives are to study whether ACNs, PAs and their combinations affect: a. Proliferation rate of the endothelial cells and b. Speed of endothelial cell migration after acute exposure to different concentrations of ACNs, PAs and their combinations.

Human umbilical vein endothelial cells (HUV-EC-C [HUVEC] (ATCC® CRL-1730™)) were used and the AlamarBlue cytotoxicity assay was performed to determine the appropriate ACN and PA concentrations for the cell migration experiments. ACNs and PA-rich fractions were extracted from freeze dried wild blueberry powder (Cherryfield, Maine, USA) and characterized by liquid chromatography (Alliance mod. 2695, Water, Milford, MA). Anthocyanins (0.0001µg/ml - 1000µg/ml) and PAs (0.0001µg/ml - 500µg/ml) were tested to determine their cytotoxicity after 24h exposure. The speed of endothelial cell migration (µm/hour) was measured by live-cell imaging (Nikon TS100) with usage of the wound healing assay dish (Ibidi, Munich, Germany). Anthocyanins at 0.002µg/ml, 8µg/ml, 15µg/ml, 60µg/ml, 120µg/ml and 300µg/ml, PAs at 0.002µg/ml, 8µg/ml, 15µg/ml, 60µg/ml, 120µg/ml and 300µg/ml and combination of both bioactive compounds at 0.002µg/ml, 8µg/ml, 15µg/ml, 60µg/ml, 120µg/ml and 300µg/ml from each ACN and PA-rich fraction were tested after exposure of HUVECs for a maximum of fifteen (15) hours.

Cytotoxicity assays documented that ACNs at 1000µg/ml was toxic to HUVECs and was not used in further experiments. Analysis of the time-lapse videos (TScratch, Zurich, Switzerland) documented inhibition of endothelial cell migration speed (µm/hour) when cells were treated with 60µg/ml of ACNs (28.3µm/hour) compared to control (34.3µm/hour) ($p < 0.05$). In contrast to ACNS, PAs at 0.002µg/ml, 60 µg/ml and 120µg/ml increased migration speed (47.06µm/hour, 45.7µm/hour and 40.36µm/hour respectively) compared to control (34.3µm/hour) ($p < 0.05$). Moreover, combination of both compounds at concentrations of 8µg/ml: 8µg/ml (ACNs:PAs) and 60 µg/ml: 60µg/ml (ACNs:PAs) revealed increased migration speed (39.98µm/hour and 46.09µm/hour respectively) compared to control (34.3µm/hour) ($p < 0.05$).

Findings suggest that endothelial cell migration is differentially modulated based on the bioactive fraction and is concentration-dependent. ACNs appear to inhibit HUVEC migration while PAs promote this process. Further investigation is necessary to determine the mechanisms behind this biological phenomenon with possible implications to atherosclerosis.

IMPACT OF A BINGE-LIKE FEEDING BEHAVIOR ON PLASMA ENDOCRINE PEPTIDES AND ALCOHOL INTAKE IN RATS

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It is unclear how changes in plasma endocrine peptides secondary to binge-feeding behavior impact alcohol intake. We characterized the impact of limited access to a HFD on alcohol intake and plasma endocrine peptides in rodents. Rats, matched for body weight and food intake, received chow or limited access to a HFD for 6 weeks. Normal chow was available ad libitum to all groups. Following six weeks, plasma levels of feeding peptides were correlated with ethanol intake. Rats in the HFD group displayed a binge-like feeding pattern. Alcohol intake was significantly attenuated, whereas plasma acyl-ghrelin concentration was significantly elevated in the HFD group. These surprising data are in agreement with the notion that central ghrelin receptor activity as opposed to circulating ghrelin levels per se, controls alcohol intake. Collectively, our data suggest that binge-like HFD intake decreases alcohol intake; an effect unexplained by flux in the plasma ghrelin levels.

LIFE MODIFICATION TREATMENT OF METABOLIC SYNDROME IN SCHOOLCHILDREN WITH HIGH RISK ATHEROSCLEROTIC FAMILY HISTORY

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Metabolic syndrome of schoolchildren with high risk atherosclerotic family history was described by us earlier. The investigation of the effect of 2-3 years long life modification treatment containing diet, physical exercise and no smoking advices on metabolic syndrome of schoolchildren with high risk atherosclerotic family background is the objective of this paper.

Patients were 872 girls and 715 boys aged 6-17 years having three from the following symptoms: serum triglyceride level above 1,1 or 1,4 mmol/L due to age, plasma insulin level above 20 IE, serum HDL-cholesterol level below 0,9 mmol/L, systolic blood pressure above 95 centiles according to the age and height, body mass index above 95 centiles, non-alcoholic fatty liver disease.

Method: The method contained advices about the low fat, low salt, no refined sugar, high fiber and high antioxidant diet, daily physical exercise accommodated for the family possibilities and the lack of any smoking controlled by nutritionists, physical exercise teachers and medical doctors. Some patients finished the care period after 2 years, others finished after 3 years.

Results: Our results showed that after the care period the above mentioned risk factors were no more detected in 615 girls and 573 boys. Significant improvements were observed in further 136 girls and 98 boys. Systolic blood pressure has normalized earlier and much more time was necessary for the improvement of non alcoholic fatty liver disease. No any changes were detected in 121 girls and 44 boys because of the lack of cooperation or other especially endocrine illnesses.

Conclusion: We concluded that the life modification treatment seems to be useful weapon against metabolic syndrome observed in schoolchildren with high risk atherosclerotic family background if the cooperation among health services, families and their children is ensured.

DIETARY PROTEIN INTAKES ABOVE THE CURRENT RDA ARE ASSOCIATED WITH IMPROVED BONE OUTCOMES

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Protein makes up roughly one-third of bone mass, and dietary intake of this essential nutrient is fundamental for optimal acquisition and maintenance of bone across all life stages. A variety of proteins, predominantly collagen, make up the organic matrix of bone, which undergoes continuous turnover and remodeling. Although considerable attention has been given to the type and amount of dietary protein intake necessary to achieve optimal bone health, authoritative bodies have varying recommendations around the intake of dietary protein, largely established on non-bone health outcomes. Prior meta-analyses have attempted to address the longstanding scientific controversy surrounding the effectiveness of protein intake on bone health. The peer-reviewed literature is clearly limited by heterogeneity and a variety of designs, doses, durations and outcomes across studies. Specifically, many studies are limited by use of hormone replacement therapy and/or other lifestyle factors like weight loss that may counter and/or mask the effects of increased protein intake on bone. Thus we systematically reviewed prospective cohort studies and randomized controlled trials that assessed protein intake and bone health outcomes. We excluded studies that did not control for hormone replacement therapy, weight loss and other lifestyle factors. Protein consumption above the current RDA of 0.8 g/kg was associated with a 34% reduction in hip fractures (HR, 0.66 [95%CI, 0.37-0.94]) as well as improvements in bone mineral density and bone mineral composition at several sites. Studies also suggest that higher protein intakes increase urinary calcium levels (SMD, 0.35 [95% CI, 0.18-0.51]) which has been shown to be fairly irrelevant to bone because of the increase in net calcium

absorption shown in modern tracer studies. No significant differences were shown between intake of plant vs. animal protein. Our review affirms that increased protein intakes should be recommended for promoting optimal bone health and preventing osteoporosis and/or low bone mass later in life.

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Key Words: protein, bone, BMD, fractures, RDA

A SYSTEMATIC REVIEW OF ANTHOCYANINS AND MARKERS OF CVD

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Anthocyanins are red-orange to violet-blue dietary flavonoids commonly consumed in the diet, which have been suggested to have a preventative effect on cardiovascular disease (CVD) development among epidemiological studies. We systematically reviewed randomized controlled trials (RCTs) testing the effects of purified anthocyanins and anthocyanin-rich extracts on markers of CVD (triglycerides, total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and blood pressure) in both healthy and diseased populations. Eligible studies included RCTs of adults published in English. We searched PubMed, Web of Science Core Collection, and BIOSIS Previews for relevant articles from inception until 1 July 2014. Twelve RCTs representing 10 studies were included in this review. Supplementation with anthocyanins significantly improved LDL cholesterol among diseased individuals or those with elevated biomarkers. Supplementation did not significantly affect other markers of CVD in either healthy individuals or those with elevated markers. No adverse effects of anthocyanins were reported across studies at levels up to 640 mg/day. Limitations of trials in the qualitative analyses include short trial duration and large variability in the dose administered within the trials. Longer-duration trials assessing dose response are needed to adequately determine whether an effect of supplementation exists.

Author disclosures: The authors have no conflicts of interest to disclose.

Key Words: protein, bone, BMD, fractures, RDA

POSTER PRESENTATIONS

AMINO ACID AND CHROMIUM ENRICHED TABLE WATER ADDED TO A STANDARDIZED MEAL IMPROVE POSTPRANDIAL GLUCOSE REGULATION

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Background: Previous studies have shown that relatively small doses of protein and/or amino acids can improve postprandial glucose tolerance at a high carbohydrate meal. In addition, chromium has been proven to facilitate insulin signaling and could help to improve glucose handling in normal subjects and those at risk of developing insulin resistance.

Aim: To study the influence of an amino acid (AA) and chromium picolinate (CrPic) enriched table water on glucose response in healthy subjects.

Methods: A control drink (carbonated, flavored water) and a test drink (1.75 g AA mixture (leucine, isoleucine, valine, lysine and threonine) and 120 micrograms CrPic), respectively, were served along with a standardized white bread based sandwich meal to 20 healthy, normal to overweight subjects. The study design was randomized, cross-over and the BMI-range and age of the participants were 20-31 kg/m² (mean 24) and 22-59 years (mean 43), respectively. The sandwich meal consisted of white wheat bread, butter and strawberry jam corresponding to a total of 62 g available carbohydrates. Subjects were instructed to take a sip of the test and control drink, respectively, before starting the sandwich meal. Glucose and insulin responses were measured in venous blood at 0 (fasting), 15, 30, 60, 90, 120 and 180 min after the start of the meal.

Results: Incremental AUC (0-180 min) for glucose was reduced by 41% when the test drink containing AA+CrPic was taken together with the carbohydrate challenge. No significant change in insulin was observed between the meals.

Conclusion: Adding carbonized and non-caloric flavored table water with small amounts of amino acids and chromium piccolinate, substantially reduced postprandial glycemia without an increase in insulin. It is hypothesized that taking a small portion of the drink already before the meal, may stimulate early insulin release that improve glucose handling, without an overall effect on insulinemia.

A HIGH-FIBER, BEAN-RICH DIET VERSUS A LOW-CARBOHYDRATE DIET FOR OBESITY: A 1-year Follow-UP ANALYSIS

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Background: Given the popularity of high-fiber and low-carbohydrate diet for weight loss, it is necessary to evaluate the extent of their efficacy and long-term compliance. We had previously shown that after 16 weeks following either a high-fiber or low-carbohydrate diet resulted in similar losses in body weight, Body Mass Index (BMI), waist and hip circumferences. The purpose of these analyses were to determine the effects of each diet on body weight and weight management after 52 weeks, using a randomized control trial design.

Methods and Results: Females and males (n = 173, mean BMI = 36 kg/m²) were randomized to either a high-fiber bean-rich diet or a low-carbohydrate diet (<120 g/day carbohydrate). Following a 3-day feeding phase, the diets were gradually implemented over a 4-week period. After this introductory phase, participants were followed for 52 weeks with anthropometric and dietary data collection occurring at regular intervals throughout the length of the study. Males in the high-fiber group consumed mean (SD) fiber intakes of 42.5 (30.3) g/day, whereas females consumed 35.5 (18.6) g/day. Among 53 completers at 52 weeks, mean (SD) weight loss was 4.6 (3.8) kg in the high-fiber group and 6.9 (4.7) kg for the low-carbohydrate group [difference, 2.3 kg, 95% Confidence Interval (CI) = - 4.7 to - 0.06, *P* = 0.04]. Therefore, significant differences were found between diet groups after the 1-year follow-up when assessed for changes in body weight, but not for changes in BMI (*P* = 0.067), waist circumference (*P* = 0.515), or hip circumference (*P* = 0.546). Dietary compliance in both groups was also assessed and determined to be equivalent.

Conclusions: After 1 year, dieters in the low-carbohydrate group experienced significant losses in body weight, but not BMI, waist or hip circumference measurements when compared to those in the high-fiber group. This implies that a low-carbohydrate, high protein diet may result in greater long-term weight loss than high fiber, lower protein diets. Further long-term studies comparing these diets are warranted to provide strength to these findings.

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INVESTIGATION INTO GLUTEN METABOLIZING BACTERIAL SPECIES AND THEIR INHIBITION

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Purpose: To isolate previously undiscovered gluten metabolizing bacterial species from environmental sources and to determine the factors and antagonistic bacteria responsible for their inhibition.

Methods: Previously non-investigated sources of bacteria capable of digesting gluten were determined and the sites cultured with swabbing using the Amies collection media.

The collected samples were incubate on gluten agar and the colonies isolated. Colonies of bacteria growing on Gluten agar were sub-cultured to fresh gluten agar to confirm gluten utilization. Putative gluten utilizing bacterial were then identified to genus and species level by standard laboratory methods (CLSI). The inhibitory effects of various oral mouth wash and other oral preparations were tested using a Kirby-Bauer type assay. The plates were evaluated after 30 hours of growth at 36 degrees. Calipers were used to measure zones of inhibition. Bacteriocin detection studies were also performed.

Results: Oral medicaments, such as, Crest, Listerine, Act Fluoride rinse, Chlorhexidine and Smartrinse inhibited all 16 of the gluten bacterial strains (average 10 mms.). One strain MLC 124 was more resistant to oral medicaments. Xylitol products only inhibited 9 strains, but not MLC 124. Forty standard bacteriocins () were applied to agars with Rothia species and the newly isolated bacteria. No zones of inhibition were detected with the strain MLC 124. Analysis of Variance Results:

Source	DF	SS	MS	F	P
Total	44	5060.9778	115.02222		
A	14	3348.9778	239.2127	4.1918113	0.00048
Error	30	1712	57.066667		

The 15 Groups demonstrated significant differences as to Sensitivity to Oral Medicaments (DF) 14, P=0.0005). The following groups presented with significant differences (Bonferroni pair testing); A1 vs B2, B1 vs B2, A1 vs B3, B1 vs B3, B3 vs B5, B3 vs B6, B2 vs B5, and B2 vs B6.

Conclusion: Newly discovered bacterial strains capable of digesting gluten that are resistant to oral anti-microbial agents and to antagonistic bacteria may prove to be potent probiotics for treatment of gluten sensitivity.

INHIBITION OF AUTISM SPECTRUM DISORDER ASSOCIATED BACTERIA BY POLYOLS

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Objectives: To determine the effectiveness of erythritol and xylitol in the inhibition of gut bacteria possibly associated with Autism Spectrum Disorder. Methods: Five bacterial strains associated with ASD were tested for polyol inhibitory activity: *Clostridium histolyticum*, *Bacteroides vulgatis*, *Bifidobacterium longham*, and two strains of *Clostridium boltea*. Each strain was grown in brain heart infusion/sucrose media with polyol concentrations varying from 0% to 15% for both erythritol and xylitol. Growth of *Clostridium histolyticum* and *Bifidobacterium longham* was measured after 24 hours while all other strains were evaluated at 48 hours to permit additional growth. Optical density was measured using a spectrophotometer and the plates were read at 620 nm.

Results: All strains had results indicating polyol inhibition of growth. *Clostridium histolyticum*, *Bifidobacterium longham*, and both *Clostridium bolteae* strains showed reduced growth with increasing polyol concentration with an inflection point of about 4% for both xylitol and erythritol (complete or near complete inhibition relative to control wells). *Bacteroides vulgatis* grew very lightly in the BHI/sucrose. This strain has visible growth but very low OD values. Inhibition of growth with increasing polyol concentrations was observed but assessing the polyol inhibition break point was difficult with this strain.

Conclusions: Xylitol and erythritol at sufficient concentrations were able to inhibit the growth of bacterial strains that have been associated with the development of Autism Spectrum Disorder in recently published studies.

HIGHER DIET QUALITY IS ASSOCIATED WITH LOWER CRP LEVELS IN HEALTHY, NORMAL WEIGHT AND OVERWEIGHT YOUNG WOMEN

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Inflammation is associated with risk of chronic diseases, including diabetes and cardiovascular disease (CVD). An association between diet quality and inflammatory biomarkers has been observed in middle-aged men and women. However, few studies have examined associations between diet quality and inflammation in young women. This cross-sectional analysis examines the association between diet quality and fasting serum levels of C-reactive protein (CRP), a predictor of CVD, in normal weight and overweight young women from the UMass Vitamin D Status Study (UMVDS) (n=137, mean age 21.6 years; mean BMI 23.0 kg/m²; BMI range 18.6 to <29.8 kg/m²). Dietary data were collected by a modified version of the Harvard Food Frequency Questionnaire. Diet quality over the previous 2 months was assessed using the 2010 Dietary Guidelines for Americans Adherence Index (DGAI-2010). The DGAI-2010 evaluates adherence to the 2010 Dietary Guidelines for Americans and has a possible range of 0 (least) to 100 (best). Fasting blood was collected during the mid-luteal phase of the menstrual cycle and serum CRP was assayed via a latex-enhanced turbidimetric immunoassay (CRP Ultra, Equal Diagnostics, Exton, PA, USA). Women with high CRP levels (≥ 10.0 mg/L) were excluded. After adjustment for BMI and age, we observed a significant inverse association of DGAI-2010 Score (mean=68.3 \pm 7.0; range 42.6 to 81.7) and log transformed CRP (p=0.015). With further adjustment for physical activity (METS/week), multivitamin use (Y/N), current smoking status (Y/N), and race/ethnicity, the association remained significant (p=0.0009). Mean CRP levels (mg/L) by quintile of DGAI Score were (Q1) 2.4 \pm 0.6, (Q2) 2.0 \pm 0.5, (Q3) 1.8 \pm 0.4, (Q4) 1.6 \pm 0.4, and (Q5) 1.0 \pm 0.2. This analysis suggests an association between higher diet quality and lower CRP in young women.

A UNIQUE SYSTEM TO TEST THE ANTIOXIDANT CAPABILITY AND REJUVENATION OF GLUTATHIONE

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Reduced glutathione is a well-described antioxidant, which when oxidized, becomes ineffective at inhibiting free radicals. Through the use of a chemical model system developed by our research group at Misericordia University's Chemistry/Biochemistry Department, the dose-response, antioxidant properties of reduced glutathione (GSH) and oxidized glutathione (GSSG), respectively, were determined quantitatively. Free radical production, which directly results in chemiluminescence, was determined by a luminol reaction initiated by peroxide in a luminometer set for a 10 second kinetics mode. Luminol reactions, while in the absence and presence of GSH and GSSG, respectively, were run in triplicate. When GSH (at 21, 42, and 85 μ M, respectively) was added to the luminol reaction, there was a significantly greater ($p \leq 0.01$) dose-response inhibition of chemiluminescence than that seen with the same concentrations of GSSG. This model system was then utilized with glutathione reductase and its coenzyme NADPH in the presence of the same concentrations of both GSH and GSSG, respectively. This enzyme complex is known to convert GSSG to GSH *in vivo*. The results showed a significant reduction ($p \leq 0.01$) in chemiluminescence when the enzyme complex was added to both GSH and GSSG, respectively, with all reactions in triplicate. The results of these experiments demonstrate the ability to successfully measure the antioxidant capability of GSH and its formation from GSSG using this model system, as well as the regeneration of GSH from GSH. Further confirmation of this regeneration is being evaluated using IR and UV/VIS instrumentation.

EFFECTS OF VEGAN DIETARY PROGRAM TO NUTRITIONAL STATUS

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Background: Diet has the greatest potential in the attainment of better nutritional status in terms of body mass index, waist circumference, blood lipids, blood sugar, and blood pressure. Thus, an effective dietary program is needed. It is the purpose of this study to determine the effects of vegan dietary program to nutritional status.

Methods: This study utilized the quasi-experimental research design, using a pre-test-post-test, and a follow-up test. Forty at-risk adults participated in the vegan dietary program that consisted of vegan cooking classes, vegan meals, and nutrition education for four weeks. Nutritional assessment using anthropometric, biochemical, and clinical measurements were employed to determine the effects of the vegan dietary program. Post-test and follow-up test were conducted after four weeks and 17 weeks, respectively.

Results: There was a significant difference in body mass index, waist circumference, body fat percentage, fasting blood sugar, and diastolic blood pressure between the pre-

test and post-test, and between the pre-test and follow-up test. A significant difference on systolic blood pressure was only noted between the pre-test and post-test. Also, significant differences in HDL level and diastolic blood pressure were observed between the post-test and follow-up test.

Conclusion: The vegan dietary program was effective in improving nutritional status in terms of body mass index, waist circumference, body fat percentage, fasting blood sugar, and diastolic blood pressure at the end of the study.

SERUM ALANINE AMINOTRANSFERASE LEVELS AND THE METABOLIC SYNDROME IN US ADOLESCENTS

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Introduction: Non-alcoholic fatty liver disease (NAFLD), characterized by hepatocyte dysfunction, fat accumulation, and fibrosis, is the most common cause of chronic liver disease in children. Levels of serum alanine aminotransferase (ALT) are used clinically to assess for liver dysfunction. This analysis studied the relationship between ALT levels and a metabolic syndrome severity score (MetS Z-score) as well as BMI in adolescents. The relationship of ALT with dietary factors was also assessed.

Materials & Methods: We studied 5411 non-Hispanic-white, non-Hispanic-black, and Hispanic adolescents ages 12-19 with complete MetS Z and ALT data from the National Health and Nutrition Examination Survey 1999-2014. Elevated ALT levels were defined by 2 cut-offs: one for both sexes (30 U/L) and another that was sex-specific (22 U/L, girls; 25 U/L boys). Elevated BMI Z-Score was defined as \geq 85th percentile. Elevated MetS Z-score was defined as > 0.75 . Dietary factors were assessed through 2012.

Results: Neither the trend of mean ALT nor the prevalence of elevated ALT differed over time. BMI Z-scores significantly increased over time, while MetS Z-score significantly decreased ($p < 0.01$), associated with a drop in serum triglyceride levels. ALT levels correlated with MetS Z-score and BMI Z-score ($r^2 = 0.122$ and 0.085 , respectively, both $p < 0.0001$). There were increased odds of elevated ALT (> 30 U/L) if elevated MetSZ (OR 3.52, 95% confidence interval [CI] 2.86, 4.32) or elevated BMI-Z were present (OR 2.79, CI: 2.32, 3.36). When adjusted for age, race, and sex, ALT levels positively correlated with calories, carbohydrates, saturated fat, and unsaturated fat (all $p < 0.01$). Dietary factor measures decreased over time ($p < 0.0001$).

Conclusion: Prevalence of elevated ALT has not changed over time, potentially due to divergent trends regarding the BMI Z-score and the MetS Z-Score, as well as trends reflecting healthier eating habits. Continued vigilance in monitoring BMI and ALT levels, and sustained emphasis on healthy diet, are advised among US adolescents. MetS Zscore could act as another tool to monitor risk of elevated ALT and subsequent

development of NAFLD.

HOW TO IMPLEMENT PERSONALIZED DIETARY CHANGES IN FAMILIES TO PREVENT THE DEVELOPMENT OF METABOLIC SYNDROME

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Background: Health and disease of individuals and populations are the result of risk factors as genetics, environment, and behavior. Family history is considered an essential part of the primary intake interview. This is the reason that data on habits, attractiveness of diet, and quality of food are very important in this process. There is scientific evidence that some foods and food components have beneficial physiological effects over and above the provision of basic nutrients.

Objective: The objective of this study is to explore the use of a family personalized protocol to change food habits, behavior and include a healthy lifestyle to prevent obesity and metabolic syndrome.

Methods: To apply in a family meeting a questionnaire, interventions and changes in those families diet with a personalized nutrition plan for each month of treatment using functional foods, exercise and teaching them how to prepare their own food.

Results: The application of an personalized eating plan in a family group showed better adherence to treatment, more motivation, change of eating habits and greater weight loss.

Conclusions: The combination of the main healthy lifestyle factors maintaining a healthy weight, exercising regularly, following a healthy diet seem to be associated with as much as 80% reduction in the risk of developing chronic diseases. Applying a personalized plan according to historical family proves to be more effective in changing habits, which contributes to diseases prevention in the future.

25-HYDROXYVITAMIN D DEFICIENCY AND MYOFASCIAL PAIN IN THE SOFT WATER COUNTY OF SAN FRANCISCO, CA: ASSOCIATION OF CANCER, COLON POLYPS, AND TENDON RUPTURE

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Background: Magnesium deficiency and 25-hydroxyvitamin D [25(OH)D] deficiency have both been associated with increased morbidity and mortality. The vitamin D binding protein and the three enzymes that determine the 25(OH)D concentrations are all dependent on magnesium as a cofactor. San Francisco County is known to have very low magnesium content in the drinking water, as well as a latitude above the 37th parallel, making it likely to have low 25(OH)D concentrations in the population. Myofascial pain is known to be associated with low magnesium, and low 25(OH)D concentration.

Objective: To assess the prevalence of disease in individuals with myofascial pain and low 25(OH)D concentration in a county with low magnesium in the drinking water.

Methods: This is a retrospective cross sectional study by chart review from an internal medicine practice in San Francisco, approved by an Institutional Review Board. It was designed to examine subjects presenting with myofascial pain assessed by tender trigger points, and 25(OH)D concentrations below 30 ng/mL documented by lab analysis or by medical history. Magnesium, calcium, 25(OH)D concentrations, Body Mass Index (BMI), age, and prevalence of medical-surgical diseases were assessed.

Results: Of the 269 subjects, there were 68 men and 201 women. The mean age was 66 and 63.6 respectively. The association between low vitamin D and sensitivity of tendon trigger points were compared to all cancers, colon polyps, and tendon ruptures. The odds ratios for these conditions were between 4 and 8 for having either tendon sensitivity or low vitamin D. The OR's for cancer, colon polyps and tendon rupture are higher for the combined exposure variable than either one of the two single variables. The odds of having cancer with the combined exposure is 9.7 times the odds of not having this exposure condition. Of 80 subjects who had both myofascial pain and vitamin D less than 30 ng/mL, 74 tested for RBC magnesium. 23% were below the reference range (4.0-6.4 ng/mL). The mean as well as median RBC magnesium was 4.6 mg/dL.

Conclusion: Although there are a number of large scale randomized clinical trials looking at 25(OH)D and disease, few are looking at the important association with magnesium deficiency and myofascial pain. Also, few studies are looking at 25(OH)D concentrations in people living in soft water/low magnesium municipal districts in the United States. This data is preliminary and needs to be repeated in populations where drinking water is very low in magnesium.

SKELETAL MUSCLE METABOLOMIC ANALYSIS IN KETO-ADAPTED AND HIGH-CARBOHYDRATE ENDURANCE ATHLETES

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Background: An increasing number of elite-level ultra-endurance athletes are adopting a very low-carbohydrate, high-fat diet (LCD) in place of the traditional high-carbohydrate diet (HCD). These athletes exhibit more than a two-fold higher capacity to oxidize fat than their HCD counterparts.

Purpose: The goal of this study was to compare the metabolite profiles of skeletal muscle from elite endurance athletes habitually consuming a LCD vs. HCD.

Methods: Twenty elite ultra-endurance athletes (male, age 33.5 ± 6.4 yr, BMI 22.6 ± 3.3 kg/m², VO₂max 64.5 ± 4.9 mL/kg/min) were matched for age, anthropometrics, and competition times and distances. Participants were grouped based on habitually consuming a HCD (n=10; %CHO:PRO:FAT=59:14:25) or a LCD (n=10; 10:19:70) for at least 6 months. Muscle biopsies were obtained from the vastus lateralis before, immediately after, and 2 hr after a 3 hr treadmill run at 64% VO₂max. Metabolomic analysis of 378 known compounds was performed by Metabolon (Durham, NC, USA) using ultra-high performance liquid chromatography-tandem mass spectroscopy (UPLC-MS/MS). Twoway ANOVA with repeated measures was used to compare metabolite concentration between groups ($p \leq 0.05$).

Results: Of the 378 metabolites, there was a main effect of diet for 112 metabolites ($p \leq 0.05$), a main effect of exercise for 90 metabolites ($p \leq 0.05$), and an effect of diet by exercise for 26 metabolites ($p \leq 0.05$). In LCD athletes at rest, carnitine and its precursor deoxycarnitine were lower ($p \leq 0.05$) and several long-chain acylcarnitines were higher ($p \leq 0.05$). β -hydroxybutyrate and its precursor 3-hydroxy-3methylglutarate were higher in LCD athletes both at rest and after exercise. The glycogen metabolites maltotetraose and maltotriose were lower in LCD athletes at rest ($p \leq 0.05$).

Conclusion: A long-term ketogenic diet induces a profound change in the metabolite profile of elite ultra-endurance athletes consistent with increased fat oxidation and reduced dependence on glycogen utilization in skeletal muscle. These metabolite alterations provide opportunity for deeper understanding of keto-adaptation and its relevance to athletic performance.

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A COMPARATIVE STUDY ANALYZING SERUM LIPID PROFILES IN A HIGH-FIBER DIET VERSUS A LOW- CARBOHYDRATE DIET

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When it comes to dieting, weight reduction is often emphasized. However, individuals' biochemical profiles must also be assessed in order to promote optimal health. Both a high-fiber diet rich in legumes and a low-carbohydrate diet have been promoted for weight loss and improving blood lipids. Therefore, the study aim was to compare the effects of these diets to determine which had the greatest influence on blood lipid values. Our study protocol randomized 173 subjects to a high-fiber diet rich in beans to a low-carbohydrate diet over a period of 52 weeks. Men and women (n=173; BMI=36 kg/m²) were assigned to one of two diets: 1) a highfiber bean-rich diet of > 40 gm of fiber per day for women and >50 gm of fiber per day for men or 2) a low-carbohydrate diet of < 120 gm carbohydrates per day. Subjects were assessed over 16 weeks with 5-week follow-up intervals from baseline to track progress and diet compliance with a final visit at 52 weeks. Dieters in the high-fiber group experienced a mean (SD) decrease in

total serum cholesterol of 9.0 (18.8) mg/dl whereas those in the low-carbohydrate group experienced a mean (SD) increase of 1.1 (1.8) mg/dl. These changes were not statistically significant [difference, 10.1 mg/dl, 95% Confidence Interval (CI) = - 2.2 to 22.6, P = 0.106]. Mean (SD) decreases in low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C) was also discovered amongst those in the high-fiber group [5.8 (17.5) mg/dl and 1.0 (5.8) mg/dl, respectively]. Low-carbohydrate dieters experienced mean (SD) increases in LDL-C and HDL-C of 5.3 (25.7) mg/dl and 1.8 (7.4) mg/dl, respectively, however, these findings were not significantly different between groups [95% CI = - 0.71 to 22.9, P = 0.065, and 95% CI = - 0.85 to 6.4, P = 0.131, respectively]. Participants randomized to the high-fiber group experienced a mean (SD) decrease in triglyceride levels of 5.8 (42.2) mg/dl compared to 20.3 (40.0) mg/dl for those in the low-carbohydrate group [difference, 14.5 mg/dl, 95% CI = -36.0 to 7.0, P = 0.182]. Upon completion of the 1 year study, subjects in the high fiber, bean-rich diet experienced reduced total serum cholesterol, HDL-C, and LDL-C levels but not triglycerides in comparison to the low-carbohydrate diet group however these differences were not statistically significant. It is imperative to conduct further investigative studies to determine which diet is most beneficial for improving blood lipid profiles.

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CONSUMER INSIGHTS INTO THE BENEFITS OF DIETARY SUPPLEMENTS – REPORT OF A SURVEY

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Nutrition should be a major tool for disease prevention. Unfortunately, poor diet choices greatly increase the risks for many diseases, and the current healthcare system pays scant attention to nutrition. Findings from NHANES suggest that inadequate intakes of many nutrients exist among U.S. adults. In this regard, dietary supplements may be used to promote health and fill nutrient gaps. In fact, according a recent survey, more than two-thirds of American adults take dietary supplements and that users of supplements are more likely than non-users to make healthy dietary choices and adopt other healthy lifestyle habits.

Effects of supplement use have been studied in a cohort of consumers with documented long-term (>20 years) use of multiple supplements. Previous reports found that this cohort had improved levels of disease-risk biomarkers and reduced prevalence of diseases such as diabetes and coronary heart disease as compared to non-supplement users or multivitamin-only users from the NHANES database. Here we report the results of a survey of this cohort examining their opinions on the role of supplements in promoting health.

The online survey collected supplement usage pattern and measured consumer experience with five dietary supplements: multivitamin; resveratrol/polyphenol-rich supplement (RPS); vitamin B complex; herbal supplement containing alfalfa leaf powder; and omega-3 supplement. The online survey was sent to 3,426 U.S. consumers and of whom 907 responded (87% females). Regional distribution of the responders was as follows: 36% Midwest, 25% South, 21% Northeast and 19% West. Of all the responders, 55% were between 60 – 79 years old. More than two-thirds (69%) of responders indicated that they have been using supplements for more than 20 years. The primary reasons for using supplements were health from within (49%) and filling nutrient gaps (12%). The responses related to supplement usage experience were grouped by keywords as related to health benefits. The main benefits for multivitamins: energy (48.1%), overall health (19.5%), immunity (19.0%), well-being (14.4%); RPS: energy (26.1%), skin health (7.8%), anti-inflammation (7.5%), vision health (7.4%); B-Complex: energy (42.3%), stress relief (23.9%), calm (21.2%); Alfalfa: allergy relief (56.6%), arthritis relief (17.1%), anti-inflammation (12.7%); and Omega-3: anti-inflammation (20.6%), heart health (17.3%), joint health (14.5%).

These results indicated that long-term supplement use was driven by perceived benefits. Some perceived benefits suggest areas for future research.

INDICATIONS AND EXPERIENCE USING HEMP-DERIVED CANNABIDIOL FOR NEUROLOGIC INDICATIONS

Michael Lewis, MD, MPH, MBA, FACPM, FACN, Colonel (Retired), U.S. Army.

Context/background: Recently, there is much renewed interest in industrial hemp-derived cannabidiol, or CBD for health maintenance and certain medical indications. Seventeen years ago, a Nobel prize winning neuroscientist at the National Institutes of Health filed for a patent describing CBD oil as a nonpsychoactive neuroprotectant and antioxidant.

Objective: Dr. Michael Lewis will describe the U.S. patent that has application in limiting neurological damage following ischemic insults, such as stroke and trauma, or in the treatment of neurodegenerative diseases such as Alzheimer's and Parkinson's Diseases. Dr. Lewis will address the science behind the cannabinoid system, particularly in the brain, and the interaction with endocannabinoids and phytocannabinoids. Additionally, Dr. Lewis will discuss his personal clinical experience using hemp-derived CBD with head injury patients and particularly the value of using CBD for anxiety that often occurs following a head injury.

Conclusions: Hemp-derived CBD oil is an exciting newly rediscovered nutritional product that is gaining widespread use throughout the United States. Understanding the science behind the cannabinoid system will allow practitioners to understand the value of CBD and when to use it in select patients.

A PILOT CLINICAL STUDY SHOWED CONSUMPTION OF TWO DIETARY SUPPLEMENTS FOR 12 WEEKS SIGNIFICANTLY INCREASED SEVERAL TYPES OF WHITE BLOOD CELL COUNTS

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Background: Dietary supplements can include food ingredients not normally consumed regularly in the standard Western diet and may clinically support health benefits for individuals.

Objective: A pilot study evaluated a proprietary blend containing vitamin C with carrier, medicinal mushrooms, and fruit extracts high in bioflavonoids (Immune+++[®], LifePharm Inc., Lake Forest CA). Another group took vitamin C formula with a proprietary supplement of a fertilized egg powder with pea and fish protein (Laminine™, LifePharm Inc., Lake Forest, CA) to evaluate effects on clinical white blood cell counts.

Method: Ten subjects selected from Wellness Medical Clinic, Diamond Bar, CA were investigated by two Primary Care Medical Doctors. Criteria selection recruited subjects (18-85 yrs.) in good general health, normal vital signs and no disease symptoms. Subjects were excluded from taking other dietary supplements 2 weeks prior to the baseline blood draw and for 12 weeks on the supplementation regimens. Subjects signed voluntary consents after instructed in supplement ingredients, regimen and clinical procedure. Subjects' total white blood cells, natural killer cells, B cells and T cells were evaluated. Group 1 (n=3) took two placebos daily, Group 2 (n=4) took two vitamin C tablets daily and Group 3 (n=3) took two vitamin C tablets with two egg supplements daily. Sample sizes were small. Clinical white blood cell counts (cells/ μ l) show a wide range for normal, high and low cell counts, however statistical analyses were accomplished using selective statistical formulas for small sample groups. Although some tests showed large standard deviations because of the broad range of cell counts, data were generated to show probabilities of less than 0.05 and reported.

Results: The group taking vitamin C formula alone showed a significant increase in total white blood cells ($p=0.013$) and a highly significant increase in T Cells ($p=0.0093$). The vitamin C and egg supplemented group showed significant increase in B cells ($p=0.0139$). The group taking vitamin C alone (Grp 2) was compared to group taking vitamin C with egg supplement (Grp 3) and showed a highly significant increase ($p=0.0059$) in B cells. Natural killer cells differences were not statistically significant in any group.

Conclusion: A proprietary immune support formula significantly increased total white blood cells and T cells. When a supplement of proprietary egg was added to the vitamin C regimen, B cells resulted in a highly significant increase, showing a possible enhancement effect. Both supplements indicated support to immune cells worth pursuing with a larger study.

CERTAIN GRAIN FOODS ARE MEANINGFUL CONTRIBUTORS OF NUTRIENT DENSITY IN US HISPANIC CHILDREN AND ADOLESCENTS: RESULTS FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY, 2009-2012

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Objective: The National Health and Nutrition Examination Survey, 2009-2012 was used to determine grain food sources of energy and nutrients in US Hispanic children and adolescents.

Methods: Analyses of grain food sources were conducted using a 24-hour recall in those 2-18 years of age (n=2,159). Sources of nutrients in grains were determined using USDA nutrient composition databases and the food groupings for grains (excluding mixed dishes). Mean energy and nutrient intakes from the total diet and from grain groups were adjusted for the sample design using appropriate weights.

Results: All grains provided 276±8 kcal/d or 14.9±0.4% kcal/d in the total diet. Similarly, grains contributed 8.0±0.3% (5.0±0.2 g/d) total fat, 5.5±0.3% (1.1±0.1 g/d) saturated fat, 16.0±0.5% (453±15 mg/d) sodium, 7.7±0.3% (8.6±0.3 g/d) total sugar, 23.4±0.7% (3.4±0.1 g/d) dietary fiber, 12.3±0.3% (121.8±4.4 mg/d) calcium, 40.0±0.9% (251.5±11.2 DFE/d) folate, 35.8±0.9% (6.1±0.3 mg/d) iron, and 15.0±0.4% (37.0±1.3 mg/d) magnesium. When considering select categories, breads, rolls and tortilla grains collectively provided 141±5 kcal/d or 7.5±0.3% kcal/d, 3.9±0.2% (2.5±0.2 g/d) total fat, 2.8±0.2% (0.6±0.05 g/d) saturated fat, 7.7±0.3% (230±10 mg/d) sodium, 2.1±0.1% (2.1±0.1 g/d) total sugar, 13.0±0.4% (1.9±0.1 g/d) dietary fiber, 7.2±0.3% (68.3±2.7 mg/d) calcium, 13.5±0.6% (67.3±3.0 DFE/d) folate, 11.5±0.4% (1.6±1.0 mg/d) iron, and 8.1±0.3% (20.1±0.8 mg/d) magnesium.

Conclusions: Given grains provided a greater percentage of several under-consumed nutrients (e.g., fiber/folate) and a lower percentage of nutrients to limit (e.g., saturated fat/sodium) compared to calories, certain grain foods provide nutrient density to the diet of Hispanic children and adolescents.

THE MULTIPLE BENEFITS OF *LACTOBACILLUS FERMENTUM* ME-3: A GLUTATHIONE-PRODUCING PROBIOTIC

Ross Pelton, R.Ph., Ph.D., CCN, Essential Formulas Incorporated.

Lactobacillus fermentum ME-3 (referred to as ME-3) is a strain of probiotic bacteria which has been found to produce glutathione in humans. Glutathione is referred to as the Master Antioxidant and also the Master Detox Agent. A probiotic that boosts glutathione levels in humans is a significant breakthrough in health and medicine. Studies indicate that ME-3 boosts glutathione levels via 3 different mechanisms: synthesis, extraction from the surrounding environment, and recycling oxidized

glutathione back to its active reduced form. Consequently, scientists are calling *Lactobacillus fermentum* ME-3 a “Complete Glutathione System.”

In addition to boosting glutathione levels, ME-3 also increases the recycling/regeneration of other antioxidants such as vitamin C, vitamin E and coenzyme Q10.

Lactobacillus fermentum ME-3 also synthesizes manganese superoxide dismutase (Mn-SOD) and increases the activity of PON1 paraoxonase enzymes which play a critical role in the detoxification of agricultural pesticides such as organophosphates.

This presentation will review the history of ME-3 and the results of human clinical trials which document the multiple ways ME-3 lowers oxidative stress, reduces inflammation and improves detoxification. Specific studies to be reviewed are ME-3's ability to improve outcomes in post-stroke patients, patients with atopic dermatitis and the reduction of risk factors for cardiovascular disease.

ESSENTIAL OILS AS DIETARY SUPPLEMENTS FOR MEMORY RETENTION

Dorene Petersen, American College of Healthcare Sciences, Portland, OR.

For centuries, cooks have used herbs and spices to flavor foods. Over time and with research, many of these common “seasonings” have become staples in the medical community. This presentation will explore the clinical use of aromatherapeutic essential oils from seven “seasonings” for use with memory retention and aging populations. The World Health Organization estimates that there are 47.5 million people living with dementia worldwide (approximately 7.7 million new cases a year), and Alzheimer's disease is the most common cause. What if an essential oil like rosemary could be used as a dietary supplement and topical agent to effectively support healthy brain and memory function? Together we will explore developing research into black pepper, coriander, clove, Greek sage, lavender, rosemary, and Spanish sage with a focus on aromatherapy applications for memory retention in the home and clinical aromatherapy settings.

THE VITAMIN K AND LONGEVITY ENIGMA: FAT-SOLUBLE VITAMIN SYNERGY UPDATE

Theodore Piliszek, MD, MRCS, LRCP, CNS, Houston, TX.

Evolutionary nutritional studies show us that the human genetic make-up is 99.9% that of our Paleolithic ancestors, but our nutrition and lifestyle, especially in the developed Western world, is radically different. The macro and micronutrient differences between the ancestral and our modern diet contribute to nutritionally related diseases such as hypertension, stroke, obesity, coronary and cerebrovascular disease, dyslipidemia, insulin resistance, dementia, and cancer.

Current research in both animal and human studies suggests that oxidative stress due to increased levels of reactive oxygen species and a decreased antioxidant reserve may be contributory factors. Endothelial dysfunction, omega 6 fatty-acid (inflammatory

arachidonic acid) metabolites, the renin-angiotensin-aldosterone system, and a dysfunctional sympathetic nervous system all cause increased levels of reactive oxygen species. Reduced antioxidant reserve is found in conditions associated with low intracellular and extracellular levels of both fat-soluble and water-soluble vitamins and enzymatic and non-enzymatic antioxidants. Pertinent to this discussion, recent evidence points to an intricate relationship between Vitamins A, D, E, and K (specifically Vitamin K2). The former three determine the amount and activity of specific proteins by regulating gene transcription, nuclear RNA processing, and messenger RNA stability and degradation. Vitamin K2 may not affect gene expression, but through gamma carboxylation (activation) of Vitamin K dependent proteins, like Osteocalcin, and MGP (matrix gla protein), it can prevent, slow down, and possibly reverse the degenerative effects of aging, ensuring enhanced longevity.

METABOLIC MAPPING FOR WEIGHT MANAGEMENT IN A PATIENT WITH A BROKEN HEART

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Morbidly obese (MO) patients with advanced congestive heart failure (CHF) rarely achieve the necessary BMI reduction (<35) to qualify for heart transplantation (HT). MO reduces HT survival. MO also complicates matching donor hearts because of body size. Left ventricular assist devices (LVADs) often become destination therapy for MO CHF patients if HT is not possible. We report a metabolic approach to weight loss in an LVAD patient with successful weight loss.

Case Report: 62 y/o male with atrial fibrillation (AF), s/p stroke, MI x2, pacemaker, CHF, HLD (?), sleep apnea and spinal stenosis. He was on an LVAD and sought weight loss for anticipated heart transplant. His maximum weight was 340 pounds, height 72.5 inches (BMI 45.47). He weighed 271 on initial visit (BMI 36.25). The IBW was 181, ABW 220. We performed a metabolic evaluation which included resting metabolic rate, bioimpedance body composition, glucose tolerance with insulin levels at 0, 30, 60, 90, 120 and 180 minutes, prolactin, ACTH, cortisol, testosterone and thyroid levels. Lipid levels, macro/microminerals and major vitamins were measured.

Results: Metabolic Mapping showed reactive hypoglycemia (47 mg/dL at 180 minutes), insulin resistance, dyslipidemia, inflammation, excessive snacking, emotional eating, reward seeking and excessive food consumption between dinner and bedtime. He was given a 50 gm/d CHO restriction, daily exercise regimen, and behavioral counselling. He lost 35 lbs over period of 4 months to a weight of 235 (BMI 31.52) through lifestyle and behavior modification. He subsequently underwent a successful cardiac transplant.

Discussion and Conclusion: MO CHF patients need effective weight loss strategies to qualify for HT. The possibility of coupling of LVAD placement with gastric bypass surgery has been considered. Our experience shows that a metabolic approach can be successful with selected patients.

YOGURT A SUBSTITUTE FOR CALCIUM IN LACTOSE INTOLERANT PATIENTS: AN OBSERVATIONAL STUDY

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Background: Lactose intolerance is common digestive problem where body is unable to digest lactose, found in milk and dairy products. People with lactose intolerance tend to avoid milk which leads to calcium deficiency in them. Yogurt i/curd is an excellent source of higher quality of protein, calcium, potassium, phosphorous, magnesium, zinc and the B-vitamins such as riboflavin, niacin, vitamin B6 and B12. In yogurt/curd 40% lactose is already digested by bacteria. Hence a study was planned to find out whether the patients who cannot digest 25g lactose (which is equivalent to 500ml milk) can digest curd made up of 500ml milk.

Methods: 65 patients, who were lactose intolerant, were enrolled in this study. To establish lactose intolerance, non-invasive lactose breath test was done after overnight fast. For this, 25g lactose dissolved in 250 ml water was given orally after taking fasting breath H₂ and CH₄ concentrations. End expiratory breath was collected every 30 minutes up to 4 hrs and measured by using SC Microlyser. Rise \geq 20ppm over baseline value in H₂ and/or CH₄ concentration in two consecutive readings was considered as lactose intolerance. History of intake of milk and milk products was taken for these lactose intolerant patients. After one week of establishing lactose intolerance, breath test was repeated with yogurt/curd made up of 500 ml of milk.

Results: It was observed that all lactose intolerant patients confirmed by lactose breath test gave the history of not drinking milk and not eating products made up of milk because they get gastrointestinal symptoms such as flatulence / bloating /abdomen pain and /or diarrhea after drinking milk or eating products made up of milk .These patients also developed gastrointestinal symptoms during lactose breath test. It was also observed from the results of lactose breath test using yogurt/curd (made up of 500ml milk) as a substrate that breath test was normal in all patients in whom it was abnormal with 25g lactose and nobody had gastrointestinal symptoms during the test.

Conclusion: This study indicates that lactose intolerant patients can be advised to eat the yogurt/curd made up of 500ml milk per day so that their requirement for calcium can be fulfilled.

CALCIUM INTAKE AND IRON STATUS – THE INTERACTION BETWEEN MICRONUTRIENTS

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Calcium and Iron are both micronutrients frequently supplemented by the American population in an attempt to reduce the risks of developing osteoporosis and anemia, respectively. Osteoporosis affects an estimated 54 million Americans whereas iron deficiency anemia prevalence is as high as 9-16% in women of childbearing age. Due to hormonal regulation and menstruation, women are at much greater risk for developing both osteoporosis and iron deficiency anemia. Consequently, women are frequently recommended to supplement both micronutrients. It has been well documented that calcium and iron compete for intestinal absorption, and consuming them in unison reduces the bioavailability of each micronutrient. Single meal studies have demonstrated iron absorption reductions as high as 60% when consuming 300 milligrams of calcium in the same meal. However, prospective calcium supplementation studies have failed to show significant reductions in iron status biomarkers even after one year of calcium supplementation. The seemingly contradictory evidence that calcium decreases iron bioavailability in single meal studies yet does not appear to decrease iron status in the long term is not yet understood. This study sought to examine the relationship between calcium and iron by utilizing dietary recall reports of calcium intake and biomarkers to assess iron status. Data were collected from a cross-sectional study called the National Health and Nutrition Examination Survey (NHANES). Data were used from the 2007-2008 survey and included a total of 10,149 participants (male = 5096, female = 5053) between the ages of 0 to 80 (mean = 33 Std 25.5). Calcium intake was estimated in milligrams per day using detailed dietary analyses of a 24 hour period. Iron status was measured using serum ferritin levels which are a useful biomarker for assessing the severity of anemia. 653 people had data for both calcium intake and serum ferritin levels and were included in the statistical analysis using IBM SPSS Statistics Version 22 software. A one-way analysis of variance (ANOVA) indicated that mean serum ferritin levels were not significantly different between groups of varying calcium intakes ($F(3, 649) = 0.890, p = 0.446$). This analysis of NHANES data is consistent with several long term studies implicating that long term calcium supplementation does not interfere with iron absorption or impact resulting iron status. In conclusion, this study supports the evidence that long-term, high-level calcium consumption does not increase the risk of iron deficiency.

HOW DID AN ALBINO PATIENT LOSE 148 LBS OF WEIGHT? A CASE REPORT

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Introduction: Obesity is a highly prevalent and yet the most neglected disease. The number of overweight and obese people reached 2.3 billion and 700 million worldwide respectively, by the year 2015. Obesity is not a social disgrace but an actual disease with a major genetic component to its etiology. Obesity treatment is a lifelong task. Weight reduction medications should be used as an adjunct to diet restriction, exercise and behavioral modifications, when these measures alone have not resulted in adequate weight loss. We hereby present a case of a morbidly obese male patient with

oculocutaneous albinism who has lost 148 lbs of weight. Furthermore, the report highlights the genetic link between oculocutaneous albinism and obesity.

Case Presentation: 28-year-old male with oculocutaneous albinism presented with 361.8 lbs of weight (BMI: 62.1) and complaint of difficulty in losing weight. Physical examination revealed hypertension, low intelligence, gynecomastia and infantile testicles. Lab investigations showed unregulated hyperlipidemia and hypotestosteronemia. The patient was prescribed Orlistat 120 mg. Over the period of five years, he lost 83.8 lbs. After this time, Orlistat's effectiveness was significantly reduced. Consequently, the patient was started on Liraglutide on which he lost 64 lbs in three years. Thus, a sum of 147.8 lbs of weight was lost without any side effects of the drugs.

Discussion: Obesity needs to be treated within the healthcare system as any other complex disease. We observed Orlistat and Liraglutide to be safe and effective in reducing obesity. Substantial literature has emerged to show that in both Oculocutaneous albinism and Prader-Willi syndrome (the most common genetic cause of obesity) the P gene is mutated on Chromosome 15. This highlights the genetic susceptibility of our albino patient for developing morbid obesity.

Conclusion: Obesity develops from the interplay of both genetic and environmental factors. This case clearly illustrates that Orlistat and Liraglutide can be safe and efficient for weight loss in a morbidly obese patient. Furthermore, scientific research in the genetic aspects of obesity can help develop new strategies towards its prevention and treatment.

Key Words: Obesity, Prader-Willi Syndrome, Liraglutide, Weight Management, Orlistat

PATIENTS' PERSPECTIVES ON HEALTHY DIETARY BEHAVIOR AMONG INDIVIDUALS WITH CARDIOVASCULAR DISEASE IN THE U.S. AND JAPAN

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Background: Cardiovascular disease (CVD) is the leading cause of death in the U.S. and Japan. Mediterranean diet and DASH diet are beneficial for individuals with CVD, however nutritional education is still not personalized enough among people with CVD. Little research has been done on how individuals who have CVD view healthy dietary behavior. The hypothesis of this study is that health promotion including health education may impact individuals' dietary habit.

Objective: To investigate patient perspectives on healthy dietary behaviors among individuals with CVD in the U.S. and Japan.

Methods: A cross-sectional study with a self-reported questionnaire was conducted in cardiac rehabilitation centers (CRs) in the U.S. and Japan. Descriptive and multi-correlation analyses were performed by SPSS.

Results: 176 individuals with CVD in a phase II CR program participated in the study (U.S. 56, JPN 120; myocardial infarction (MI) 102, after coronary artery bypass graft (CABG) 73, Unknown 1). Both in the U.S. and Japan people valued eating more vegetables (U.S. 80.4%; JPN 85%) and avoiding eating sodium (U.S. 62.5%; JPN 67.5%). People with CVD in the U.S. valued drinking more water (75%; $p < .001$), eating more fruits (71.4%; $p < .001$), avoiding fast food (66.1%; $p < .01$), and trying to check food nutrition labels (57.1%; $p < .001$), while people with CVD in Japan valued the timing and frequency of meals by not skipping meals (69.2%; $p < .001$), not eating too much food (71.7%; $p < .01$), and trying to avoid eating at mid-night (57.5%). A Confucian-inspired caloric restriction practice known as Hara hachibu meaning '80% full, not 100% full' was encountered in Japan in this study. People with CVD in the U.S. had a much higher confidence in their ability to achieve an ideal diet compared to people with CVD in Japan ($p < .001$). People with CVD in Japan thought they did not have enough knowledge about diet (40.0%), significantly more than people with CVD in the U.S (11.8%). Being overweight or obese (BMI over 25 and 30) was a critical issue for U.S. men (66.7%), and among Japanese patients' high prevalence of Type 2 diabetes mellitus (21.67%) should be screened for.

Conclusions: In order to better assist individuals with CVD, CRs in the U.S. can focus on weight management, while CRs in Japan can provide more nutritional education to patients.

PSYCHOLOGICAL AND BEHAVIORAL TRAITS AS PREDICTORS OF COMPLIANCE WITH WEIGHT LOSS RECOMMENDATIONS

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Background: Previous research has explored individual psychological and behavioral traits that could be used to predict who will be successful in behavioral weight loss programs. Results across studies have been mixed, showing that while these individual factors may be important in achieving individual weight loss success, there may be other factors, such as compliance with weight loss recommendations, which mediate the relationship between individual traits and weight loss success.

Objective: To determine if pretreatment measures of psychological and behavioral factors can predict participant compliance with diet and physical activity recommendations during a 12-month behavioral weight loss intervention.

Methods: This was a secondary analysis of a prospective cohort study of overweight and obese participants enrolled in a behavioral weight loss intervention. Participants were provided with individualized calorie and physical activity goals. Nutrient intake and physical activity were assessed by three-day food records and a physical activity screener at 3-, 6-, and 12-months. A compliance score for both diet and physical activity was calculated by comparing prescribed goals and reported nutrient and physical activity data. To collect pretreatment behavioral and psychological variables,

participants completed the Dieting Readiness Test, the Weight and Lifestyle Inventory, and the NEO Personality Index-Revised questionnaires.

Results: All regression models predicted compliance for both diet and physical activity recommendations at each time point ($p < 0.05$). Several individual factors were significant within and across each model. For diet compliance, higher BMI and lower perceived stress predicted diet compliance at 6- and 12-months, with male gender and higher ratings of pretreatment hunger also being significant at 12-months. For physical activity, less perceived overeating at lunch, more overeating at dinner and male gender predicted better compliance at 3-months. At 6-months, less overeating at lunch, greater motivation to lose weight, greater time to devote to weight loss, less perceived eating due to anxiety, and older age predicted compliance. At 12-months, greater motivation to lose weight was significant. Overeating at lunch and motivation to lose weight consistently predicted better compliance with physical activity across multiple time points.

Conclusions: Several individual psychological and behavioral traits were found to significantly predict compliance with weight loss recommendations, which should lead to better weight loss outcomes. Assessing individual traits prior to behavioral weight loss interventions allows practitioners to identify individuals most likely to be compliant and those likely to need a more personalized intervention to achieve weight loss goals.

PHOSPHATIDYLSERINE CONJUGATED DOCOSAHEXAENOIC ACID ENHANCES HIPPOCAMPAL SHORT-TERM SYNAPTIC PLASTICITY AND MEMORY

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Phosphatidylserine conjugated docosahexaenoic acid (PS-DHA) has been known to produce cognitive benefits. Objective of this study was to determine the effect of PS-DHA on hippocampal Short-term potentiation (STP), the physiological correlate of hippocampal short term synaptic plasticity and short-term memory. Effect on STP was evaluated in mouse hippocampal slices treated with different concentrations of PS-DHA. The effect on short-term memory was evaluated in adult Sprague dawley rats administered with different doses of PS-DHA for 6 weeks using a contextual fear conditioning behavioral paradigm. PS-DHA at 5 μ M and 10 μ M significantly enhanced the hippocampal STP compared to control (untreated mouse hippocampal slices). Animals administered with PS-DHA at 80mg/kg bwt demonstrated a significant enhancement in contextual memory compared to vehicle treated animals. These findings suggest that PS-DHA may enhance the hippocampal short term synaptic plasticity and short-term memory.

LUTEIN AND VITAMIN E ENHANCE THE EFFECTS OF DOCOSAHEXAENOIC ACID ON NEURONAL DIFFERENTIATION

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Docosahexaenoic acid (DHA) plays a major role in neuronal differentiation. However, the high vulnerability of DHA to oxidation may impede its impact on neuronal differentiation. Antioxidants such as Lutein and Vitamin E (Vit E) may prevent the oxidation of DHA in brain and may facilitate neuronal differentiation. Objective of this study was to investigate the combined effect of Lutein, Vit E and DHA on the differentiation of SHSY5 cells to neuronal phenotype. The formation of neurite outgrowth in SHSY5 cells were determined by immunocytochemical staining and Scholl analysis. A combination of Lutein, Vit E and DHA produced 81% and 62.5% more enhancement of dendritic arborization relative to DHA alone treated and untreated SHSY5 cells respectively. Lutein and Vit E were as effective as DHA in enhancing the axonal growth. Collectively these findings suggest that enriching the levels of Lutein and Vit E together with DHA in brain may facilitate the neuronal differentiation.