Oral Presentations
DIETARY INTAKE OF MAIN FOOD GROUPS IN RELATION TO VISCERAL FAT AND LIVER FAT IN MEN AND WOMEN: THE NEO STUDY

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Background and objectives: Abdominal obesity, in particular high visceral and liver fat content, is a well-established risk factor for cardiometabolic diseases. We aimed to study dietary intake of food groups in relation to visceral adipose tissue (VAT) and hepatic triglyceride content (HTGC) in middle-aged men and women.

Methods: In this cross-sectional analysis of the Netherlands Epidemiology of Obesity study, VAT was assessed by magnetic resonance imaging (MRI), and HTGC by proton-MR spectroscopy. Habitual intake of main food groups (dairy, meat, fruit and vegetables, and sweet snacks) was assessed using a food frequency questionnaire. We performed linear regression to examine associations of 100 g/d intake of the food groups with VAT and HTGC, adjusted for age, smoking, education, ethnicity, physical activity and total energy intake, stratified by sex.

Results: After exclusion of participants with diabetes (n=161) or missing values (n=85), 2,304 participants (47% men) were analysed, with a mean (SD) age of 55 (6) years, BMI of 25.8 (3.9) kg/m² and HTGC and VAT of 6.8 (8.2)% and 113.0 (58.7) cm² in men and 4.5 (7.2)% and 65.5 (39.8) cm² in women. Intake of dairy (per 100 g/d -0.8 cm²; 95% CI: -2.5, 0.9 in men and -2.0 cm²; 95% CI: -3.4, -0.7 in women) and fruit and vegetables (-1.8 cm²; -4.2, 0.5 and -1.6 cm²; -2.9, 0.2) were negatively associated with VAT. Meat (3.9 cm²; -4.3, 12.1 and 6.6 cm²; 0.7, 12.6) and sweet snacks (2.9 cm²; 0.9, 5.0 and 1.9 cm²; 0.1, 3.7) were positively associated with VAT. Intake of dairy (per 100 g/d HTGC was 0.98 times lower in men; 95% CI: 0.94, 1.00 and 0.94; 0.89, 0.99 in women) and fruit and vegetables (0.97; 0.92, 1.0 and 0.96; 0.91, 0.99) were negatively associated with HTGC. Sweet snacks were positively associated with HTGC (1.08; 1.03, 1.14 and 1.06; 1.00, 1.12). Additional adjustment for total body fat attenuated the associations although the associations of sweet snacks with visceral and liver fat remained.

Conclusion: Habitual intake of dairy and fruit and vegetables was negatively associated, whereas sweet snacks and meat were positively associated with visceral and liver fat content. Prospective studies need to elucidate the role of diet in visceral and liver fat accumulation.
THE ON/OFF DIET: EFFECTS OF WEEK-ON, WEEK-OFF ENERGY RESTRICTION COMPARED TO CONTINUOUS ENERGY RESTRICTION

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Background and objectives: Intermittent energy restriction (IER) has become a popular alternative to continuous dieting for weight loss but there is little long-term data on its efficacy. The aim was to investigate the effect of week-on, week-off energy restriction (IER), compared to continuous energy restriction (CER) on weight loss and weight loss maintenance after 12 and 24 months.

Methods: Participants were overweight or obese (BMI 34.04 ± 5.3kg/m², 51.8 ± 11.3 years) (n=107, 22 men and 85 women), who. Weight, body composition, and a fasting blood sample for lipids, glucose and FGF-21, were taken at 0, 8 weeks CER and 16 weeks IER, and at 12 and 24 months.

Results: Attrition was 56% at 12 and 60% at 24 months. Weight loss was -6.2±2.9kg CER, -6.4±2.3kg IER; (p=0.8) at 8 weeks and -6.3±5.2kg CER, n=27, -4.9±3.4kg IER, n=20; (p=0.3) at 12 months. There was no difference between the groups for either fat mass or lean muscle mass after 8 weeks ER or 12 months ER. At 12 months FGF-21 (P<0.02) and triglycerides concentrations decreased (-0.2 ± 0.5mmol l⁻¹ P<0.01) while the decrease in fasting glucose approached significance (-0.2 ± 0.5mmol l⁻¹ P=0.06) with no difference between groups. Total cholesterol, HDL and LDL levels did not change. Weight change between baseline and the 24mths between the groups approached significance (-4.2±3.5kg CER, n=24, -1.6±3.2kg IER, n=19; (p=0.06)). Weight increased between 12 and 24 months but was not significantly different (1.9±2.5kg CER, 3.1±3.7kg IER (p=0.2)).

Conclusions: Weight loss experienced in the first 12months was the same in each group. However by 24months the difference in overall weight loss between the groups is approaching statistical significance, and regain experienced between 12 and 24 months is numerically larger in the IER. The large attrition whilst being similar in both groups limits generalisation of the results. This study is ongoing.
CARDIORESPIRATORY FITNESS VERSUS PHYSICAL ACTIVITY AS PREDICTORS OF ALL-CAUSE MORTALITY IN MEN

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Background and objectives: The findings of previous studies that have examined the independent associations between cardiorespiratory fitness (CRF), physical activity (PA), and all-cause mortality are inconsistent. In this study, we examined the independent and combined effects of CRF and PA in 8171 male veterans who were referred for exercise testing at the Veterans Affairs Medical Center in Washington, DC, or Palo Alto, CA.

Methods: CRF was assessed by a maximal exercise treadmill test and PA was measured by self-reported questionnaire. There were 1349 deaths during a mean (± SD) follow-up of 8.7 (4.4) years. Cox proportional hazard models were used to assess the independent associations between CRF, PA, and mortality. To further explore the interaction between PA and CRF with mortality, we dichotomized the cohort into fit and unfit groups, defined by a CRF threshold of 7 METS. Within the fit and unfit groups, active individuals (meeting 150 minutes of moderate or higher intensity PA per week) and inactive individuals (not meeting 150 minutes per week) were matched, 1:1, for CRF, age, and BMI. Hazard ratios [HRs] compared inactive subjects (reference) with active subjects. All analyses were adjusted for age, BMI, smoking status, family history of risk factors, medication use, history of stroke, and presence or absence of hypertension, diabetes, hypercholesterolemia, or cardiovascular disease.

Results: CRF was inversely associated with mortality after adjusting for clinical variables (HR: 0.85; 95% confidence interval [CI]: 0.83 – 0.87), and remained a strong predictor of mortality after further adjusting for PA; the risk reduction per 1-MET increase in CRF was 15% (HR: 0.85; CI: 0.83 – 0.87). PA was a significant predictor of mortality after controlling for clinical variables (HR: 0.83; CI: 0.75 – 0.93), however the association was eliminated after further adjusting for CRF (HR: 0.98; CI: 0.88 – 1.01). Further, within both the fit (HR: 0.93; CI: 0.76 – 1.13) and unfit groups (HR: 0.99; CI: 0.85 – 1.16), meeting the PA guidelines (Active) was not significantly associated with mortality compared to the reference group (Inactive).

Conclusions: In adult male, US veterans, CRF is associated with mortality risk independent of PA, whereas the reverse is not true.
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MAXIMAL EXERCISE HEMODYNAMICS ARE INDEPENDENT PREDICTORS OF COGNITIVE FUNCTIONS IN CORONARY HEART DISEASE PATIENTS

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Background and objectives: There is a direct link between aerobic fitness (VO2peak) and cognitive performance, especially with executive functions in coronary heart disease (CHD) patients. No study has investigated if maximal exercise hemodynamic parameters would mediate cognitive functions in CHD patients. The aim of this study was: 1) to compare VO2peak, cardiac hemodynamics parameters and cognitive functions between healthy subjects and CHD patients. 2) To assess if maximal exercise cardiac hemodynamics would be independently associated with cognitive functions in the same cohort.

Methods: Seventy-six participants (CHD: n=44; 69±9 years old; healthy subjects: n=32; 61±10 years old) were recruited for the study. All subjects completed a maximal cardiopulmonary exercise test on bike with gas exchanges, maximal cardiac hemodynamics assessment (maximal cardiac index [CImax], cardiac output [COmax] and left cardiac work index [LCWImax]) and a cognitive tests battery. Cognitive composite scores (verbal recall, executive function and psychomotor speed) were created by averaging standardized z-scores of selected tests. Mixed-models multiple regressions were used to evaluate independent predictors of the composite cognitive scores using cardiopulmonary and exercise hemodynamics variables, with age and education adjustments.

Results: VO2peak, COmax, CImax, LCWImax and peak power output were higher in the healthy group (p<0.05) vs. the CHD patients. Executive functions and psychomotor speed were higher in healthy subjects as compared to CHD patients (p<0.001). Multiple regressions analysis demonstrated that: 1) Age and COmax were independent predictor of verbal recall (46% of the variance in verbal recall was explained by age, education and COmax), 2) Age and LCWImax were independent predictor of executive function (45.3% of the variance observed in executive function was explained by age, education and LCWImax), 3) Age was the only independent predictor of psychomotor speed (36.6% of the variance observed in psychomotor speed can be explained by age and education).

Conclusions: Maximal exercise hemodynamics parameters were independent predictors of verbal recall (COmax) and executive functions (LCWImax) but not for psychomotor speed in our sample including CHD patients. However, fitness parameters do not seem to predict cognitive functions in our cohort.
A PARK TYPOLOGY IN THE QUALITY COHORT: IMPLICATIONS FOR PHYSICAL ACTIVITY AND TRUNCAL FAT AMONG YOUTH AT RISK OF OBESITY

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Background and objectives: The operationalisation of opportunities for physical activity in parks has not been studied extensively. The objectives are to explore associations between park types, physical activity and adiposity in youth.

Methods: Data were from an ongoing cohort study in children at risk of obesity. Data were collected in 512 participants (2005–2008). Analyses were restricted to 380 participants living within ≥ 1000 m of ≥ 1 park (n parks = 576). Park types were identified using principal component and cluster analyses. Linear and logistic regressions were used to explore associations between park types, and physical activity and adiposity. The reference category was children living near smaller-sized parks with no team physical activity features.

Results: Nine park types were identified. Compared to the reference group, children living near aesthetically pleasing parks with few team sports installations reported more 15-minute bouts of physical activity per week (bouts of physical activity) (β = 5.2 [90% CI: 2.3; 8.1]) and variety of physical activities (1.6 [0.1; 3.1]), and had less percent truncal fat (−3.4 [−6.4; −0.5]). Children living near parks that were low on safety items with cycling infrastructure reported more bouts of physical activity (2.2 [0; 4.3]) and variety of physical activities (0; 2.2)). Children living near parks with a variety of physical activity installations reported more bouts of physical activity (2.5 [0.2; 4.7]) and variety of physical activities (1.4 [0.2; 2.5]). Children living near parks that had team sports and pool features reported more bouts of physical activity (2.5 [0.4; 4.7]). No significant associations were found for objectively-measured physical activity.

Conclusions: Parks that emphasize unstructured activities may increase self-reported physical activity and be associated with less percent truncal fat among youth at risk of obesity.
INCREASED BODY FAT MASS MEDIATES THE POSITIVE ASSOCIATION BETWEEN CIRCULATING ESTRADIOL LEVELS AND INSULIN RESISTANCE IN POSTMENOPAUSAL WOMEN

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Background and objectives: The relationship between plasma estrogen levels and insulin resistance is still undetermined in postmenopausal women. Yet, some studies suggest that high body fat mass is associated with increased circulating estrogens. The goal of this study was to examine the relationship between estrogen levels, insulin resistance and adiposity in postmenopausal women. Other steroid hormones were also examined.

Methods: 131 postmenopausal women (age 57±7 years; BMI 27.9±4.8 kg/m²) were enrolled through the local newspapers. Fifteen steroids or metabolites were measured in plasma by liquid chromatography tandem mass spectrometry. Insulin sensitivity was assessed with a hyperinsulinemic-euglycemic clamp. Body composition was determined with hydrostatic weighing and computed tomography. Blood lipids and circulating cytokines levels were also measured.

Results: Glucose disposal rate and insulin sensitivity were lower in participants with circulating estradiol levels in the upper tertile (p=0.007 and 0.001 respectively). Participants in the upper tertile of plasma estradiol were also characterized by an altered blood lipid profile (elevated triglycerides, VLDL-cholesterol, LDL-triglycerides and HDL-triglycerides) (p=0.03 to 0.007), as well as high circulating high-sensitivity C-reactive protein, interleukin-6 and tumor necrosis factor α (p=0.03 to <0.0001). Obese women had significantly higher estradiol levels compared to overweight and lean women (7.33±2.93 vs 4.28±2.17 and 3.26±1.24 pg/mL respectively, p<0.0001). Moreover, body fat percentage was strongly and positively correlated with estradiol levels in a linear fashion (r=0.61, p<0.0001). After statistical adjustment for percent body fat, almost all correlations between estradiol and metabolic variables became non significant. Similar results were observed for estrone and estrone-sulfate, except that estrone-sulfate remained a significant correlate of metabolic variables after adjustment for percent body fat. For circulating androgens, total testosterone was significantly correlated with mid-thigh fat area (r=0.24, p=0.02). This association was independent of fat-free mass. Dihydrotestosterone was negatively correlated with visceral fat accumulation (r=-0.21 p=0.04).

Conclusions: In postmenopausal women, circulating estradiol levels were positively correlated with insulin resistance and altered blood lipid and cytokine profile, but these associations were mainly mediated by body fat mass accumulation. The strong, linear association between total body fat mass and estradiol levels is consistent with a contribution of adipose tissue steroid-converting enzymes to circulating estrogens.
Breast adipocyte diameter and waist circumference: associations with prognostic factors and expression levels of estrogen-related genes

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Background and objectives: Metabolic syndrome and its features are linked to adverse breast cancer (BC) outcomes. Dysfunctional breast adipose tissue (BrAT) has been proposed as a potential mechanistic mediator of the well-known relationship between obesity and breast cancer (BC). The objective of the study was to examine the relationship between mammary adipocyte mean diameter and waist circumference (WC) with prognostic factors for BC and the expression of aromatase (the rate-limiting enzyme for estrogen biosynthesis), 17-beta-hydroxysteroid dehydrogenase type 12 (HSD17B12, which converts estrone into estradiol) and the estrogen receptor alpha (ERα) in BrAT.

Methods: BrAT was obtained during partial or total mastectomy in a sample of 165 BC patients (age 30 to 69 years). Participants had not received chemotherapy, radiotherapy or hormone therapy before surgery. H&E-stained slides from formalin-fixed paraffin-embedded (FFPE) blocks of whole adipose tissue located ≥1 cm distal to the tumor margins were used to measure cell diameter of 250 adipocytes per patient. RNA was collected from adipose tissue cores of 0.6 mm from corresponding FFPE blocks to perform qPCR. Clinicopathologic data were abstracted from the medical records. Generalized linear models were computed to assess the associations between mean breast adipocyte diameter or WC and BC prognostic factors. All models were adjusted for age and menopausal status.

Results: Breast adipocyte diameter and WC were associated with BC tumor stage (p=0.05; p=0.0005) and histological grade (p=0.014; p<0.0001). Associations between WC and stage remained significant after further adjustment for BMI (p=0.003). Nor ER or PR status of the primary tumor was associated with breast adipocyte diameter or WC. Mammary adipocyte diameter and WC were associated with higher expression of aromatase (p=0.05; p=0.031). Only breast adipocyte mean diameter was associated with lower expression of HSD17B12 (p=0.009). WC, but not adipocyte size, was associated with lower expression of ERα (p=0.036).

Conclusions: Breast adipocyte hypertrophy and WC are associated with worse prognostic features and higher expression levels of aromatase, a key enzyme in estrogen biosynthesis in women with BC, independent of age and menopausal status reflecting both local and systemic contributions of obesity to BC.
PLASMA PCSK9 CONCENTRATIONS ARE POSITIVELY ASSOCIATED WITH THE APOLIPOPROTEIN B-48-CONTAINING TRIGLYCERIDE-RICH LIPOPROTEIN PRODUCTION RATE, INDEPENDENTLY OF INSULIN RESISTANCE

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Background and objective: Oversecretion of intestinally-derived triglyceride (TG)-rich lipoproteins (TRL) plays an important role in the pathogenesis of the dyslipidaemia associated with insulin resistance (IR). Data from in vitro studies reported that PCSK9 stimulates chylomicron secretion, in addition to its major role in lipoprotein clearance. The extent to which PCSK9 modulates apolipoprotein (apo) B-48-containing TRL kinetics in IR humans remains to be fully characterized. The objective of the present study was to investigate the association between fasting plasma PCSK9 concentrations, apolipoprotein (apo) B-48 production rate (PR), and fractional catabolic rate (FCR) in a large sample of men displaying varying degrees of IR.

Methods: A total of 107 men were included in the present study. Subjects were categorized as IR (fasting TG levels ≥1.50 mmol/L and HOMA-IR index of ≥ 2.5 or type 2 diabetes, n=83) or insulin sensitive (TG levels <1.50 mmol/L and HOMA-IR index <2.5, n=24). TRL apoB-48 in vivo kinetics were measured in all subjects following a primed-constant infusion of L-[5,5,5-D3] leucine. During the kinetic protocol, subjects were maintained in a constant fed state by consuming low-fat (22% of total caloric intake from fat), moderate-fat (35%) or high-fat snacks (41%) every 30 minutes for 12 hours.

Results: Fasting plasma PCSK9 concentrations were associated with TRL apoB-48 PR (r=0.24, P=0.005), but no association was observed with TRL apoB-48 FCR (r=-0.03, P=0.7). In subjects with PCSK9 levels above the median (276 ng/mL), TRL apoB-48 PR was 44 ± 16 (SEM) % higher than subjects with PCSK9 below the median (P=0.008). A multiple linear regression analysis showed that plasma PCSK9 concentrations were responsible for 6.9% of the variability in TRL apoB-48 PR (standard β =0.26, P=0.004). This association was independent of IR, C-reactive protein levels, body mass index, waist circumference, age, and dietary fat intake. IR status had no effect on the association between PCSK9 concentrations and TRL apoB-48 PR (interaction IR status (IR vs IS) * PCSK9, P=0.4).

Conclusion: This study suggests that plasma PCSK9 concentrations modulate the secretion of apoB-48-containing TRL, independently of IR.
COMPARISON OF HIGH-DOSE DHA AND EPA SUPPLEMENTATION ON ADIPOSE TISSUE MORPHOLOGY AND MACROPHAGE INFILTRATION AMONG ADULTS AT CARDIOVASCULAR RISK

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Background and objectives: Obesity and metabolic syndrome (MetS) are highly prevalent causes of subclinical inflammation. Adipose tissue (AT) plays a key role in MetS-related inflammation, via both adipocytes and infiltrated macrophages. Among dietary strategies to prevent MetS, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have raised tremendous interest for their anti-inflammatory potential. We previously showed that EPA and DHA had distinct effects on markers of systemic inflammation. However, it remains unclear if EPA and DHA also have distinct effects on local inflammation in AT. The objective of this study was to compare the individual effect of EPA and DHA on the AT morphology and macrophage infiltration of men and women at risk of cardiovascular disease (CVD).

Methods: In a randomized double-blind crossover trial, 10 women and 3 men with abdominal obesity and low-grade inflammation were subjected to three 10-wk supplementation phases: 1) EPA (2.7 g/d); 2) DHA (2.7 g/d); 3) corn oil (control), separated by a 9-wk washout. Samples of abdominal subcutaneous AT were obtained after each phase. Supplements were provided as 1g capsules for a total of 3g/d. Adipocyte diameter was determined by histological analysis (H&E staining). Double immunofluorescence was performed to quantify total (CD68), M1 (CD11c) and M2 (CD163) macrophages in AT.

Results: Frequency distributions of adipocyte size were not different between EPA, DHA and control (P=0.60). Mean adipocyte diameter was also similar after EPA and DHA (P=0.84). Proportions of total (P=0.32), M1 (P=0.67) and M2 (P=0.56) macrophages were not differentially modified by EPA and DHA.

Conclusions: These data suggest that high-dose EPA and DHA supplementation do not modify adipocyte size nor macrophage infiltration in abdominal subcutaneous AT of individuals at risk of CVD. Further mechanistic studies are needed to explore the distinct effects of EPA and DHA on systemic inflammation.
Poster Presentations
ARE CHANGES IN 25(OH) VITAMIN D LEVELS AND INSULIN SECRETION PRODUCED BY A LIFESTYLE MODIFICATION PROGRAM MEDIATED BY VISCERAL ADIPOSY CHANGES?

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Background and objectives: Vitamin D deficiency has been associated with obesity while both obesity and vitamin D deficiency have been linked to diabetes. The respective contributions of adiposity vs. vitamin D levels to insulin secretion remain unclear. The objective of the study was to investigate which of the following variables had the strongest association to the improvement in insulin secretion in response to a 1-year lifestyle intervention: changes (∆) in plasma 25-hydroxyvitamin D (25(OH)D) levels, changes in visceral adipose tissue (VAT) reduction or changes in leptin levels.

Methods: Sedentary, abnormally obese and dyslipidemic men (n=113) were recruited from the community to be involved in a 1-year lifestyle modification program (SYNERGIE study). Subjects were individually counselled by a kinesiologist and a nutritionist once every 2 weeks during the first 4 months with subsequent monthly visits in order to elicit a 500 kcal daily energy deficit and to increase physical activity/exercise habits. The cardiometabolic risk profile and adiposity mapping by computed tomography were assessed, to which a plasma vitamin D measurement was added.

Results: The 1-year intervention resulted in a 27% increase in plasma 25(OH) vitamin D (from 50±18 nmol/L to 60±18 nmol/L, p<0.0001). One-year increases in 25(OH)D levels correlated inversely with ∆VAT volume (r=-0.30, p<0.005) and ∆leptin levels (r=-0.41, p<0.0001). The significant associations between ∆25(OH)D and ∆AUC C-peptide (r=-0.46, p<0.001) and ∆AUC glucose (r=-0.35, p<0.005) remained significant after adjustment for ∆VAT volume (∆AUC C-peptide r=-0.33, p=0.002; ∆AUC glucose r=-0.22, p=0.04) or ∆leptin levels (∆AUC C-peptide r=-0.30, p=0.004; ∆AUC glucose r=-0.22, p=0.03). However, the significant association between changes in 25(OH)D and insulin secretion (∆AUC C-peptide/AUC glucose) (r=-0.29, p=0.004) became nonsignificant after adjusting for ∆VAT volume (r=-0.18, p=0.1) or for ∆leptin levels (r=-0.16, p=0.14).

Conclusions: The lack of association between 25(OH)D changes and insulin secretion changes (∆AUC C-peptide/AUC glucose) after adjustment for VAT volume changes suggests that both 25(OH)D and insulin secretion changes induced by a lifestyle modification program were mediated by changes in visceral adiposity.
VISCERAL ADIPOSITY, LEPTINEMIA AND 25(OH) VITAMIN D LEVELS

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Background and objectives: Vitamin D deficiency and elevated leptinemia have both been associated with obesity in numerous studies. To date, whether there is an association between vitamin D and leptin levels independent from adiposity remains uncertain. The objective of the study was to investigate the associations between changes in 25(OH) vitamin D levels, changes in adiposity variables and changes in leptin levels following a 1-year lifestyle intervention program.

Methods: This intervention study (SYNERGIE study) was performed on participants recruited from the general community. Sedentary, abdominally obese and dyslipidemic men (n=113) were involved in a 1-year lifestyle modification program. They were individually counselled by a kinesiologist and a nutritionist once every 2 weeks during the first 4 months with subsequent monthly visits in order to elicit a 500 kcal daily energy deficit and to increase physical activity/exercise habits. Cardiometabolic risk variables were assessed, as well as plasma vitamin D measurement and adipose tissue distribution by computed tomography.

Results: The 1-year intervention resulted in a 27% increase in plasma 25(OH) vitamin D (from 50±18 nmol/L to 60±18 nmol/L, p<0.0001), a 26% decrease in visceral adipose tissue volume (from 1951±481 cm3 to 1463±566 cm3) and a 27% decrease in leptin levels (from 12±8 ng/mL to 9±8 ng/mL). One-year increases in 25(OH)D levels correlated inversely with 1-year changes in leptin levels (r=-0.41, p<0.001). This association remained significant after adjustment for 1-year changes in various adiposity indices: visceral adipose tissue (r=-0.30, p=0.002), subcutaneous adipose tissue (r=-0.35, p=0.0004), total abdominal adipose tissue (r=-0.31, p=0.002) and fat mass (r=-0.31, p=0.001).

Conclusions: Changes in 25(OH) vitamin D were independently associated with changes in leptinemia after adjustment for adiposity changes. This finding supports the notion of a possible link between 25(OH)D vitamin D and leptinemia independent from adiposity.
VALIDATION OF A NEW PERSONAL DEVICE TO ASSESS BODY COMPOSITION IN OVERWEIGHT AND OBESE PARTICIPANTS: COMPARISONS WITH DXA AND BIA

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Background and objectives: Accurate identification of adiposity is key to establishing a person’s health status. Dual-energy X-ray absorptiometry (DXA) is commonly used to assess body composition but is impractical due to the expense and radiation exposure. Bioelectrical Impedance Analysis (BIA) is an inexpensive alternative but its accuracy has been suggested to decrease as adiposity increases. “Skulpt” is a relatively new personal device used to measure adiposity through Electrical Impedance Myography (EIM) but its validity is unknown. The study’s objective was to evaluate the agreement between EIM with DXA and BIA based on weight status.

Methods: In a sample of 82 healthy adults (48 women: 12 overweight, 8 obese: 34 men: 15 overweight, 7 obese), fat percentage was measured with DXA, two BIA (Impedimed SFB7 [IMP] and BodyStat Quadscan 4000 [QS]) and an EIM (Skulpt Chisel) device. Based on body mass index (BMI), weight status was classified as Normal (BMI<25), Overweight (25<BMI<30) and Obese (BMI>30). Comparisons between devices were assessed through intraclass correlation coefficients (ICC), Bland-Altman plots and paired t-tests.

Results: Compared with DXA, the ICC was moderate-to-high (QS: ICC=0.87, IMP: ICC=0.90, EIM: ICC=0.77). However, as BMI increased, accuracy decreased in EIM compared with DXA: differences were +1.28% (p=0.07), -10.1% (p=0.004), and -13.4% (p=0.03) among normal-weight, overweight and obese men respectively, and -7.2% (p=0.03), -14.1% (p=0.1), and -11.4% (p=0.03) among normal-weight, overweight and obese women respectively. Bland Altman plots revealed that as fat percentage increased, IMP and QS had a negative bias and EIM had an increasing error. The differences between DXA and each device were weakly correlated with one another (r<0.4).

Conclusions: These devices should not be used interchangeably: the EIM device (1) consistently underestimated fat percentage and (2) increased in error as BMI increased, but (3) did not demonstrate the same negative bias with increasing BMI as seen in the BIA devices. Nevertheless, before the EIM device should be recommended as an alternative to DXA for personal or clinical use, these methodological issues should be further investigated in additional studies. In particular, whether the EIM device is a valid proxy for measuring adiposity over the long-term is needed.
CHANGES IN THE INTRA-ABDOMINAL FAT DEPOTS AND ASSOCIATIONS WITH GLYCAEMIC PARAMETERS IN PATIENTS WITH TYPE 2 DIABETES UNDERGOING BARIATRIC SURGERY

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Background and objectives: Bariatric surgery has been shown to reverse glycaemic abnormalities of type 2 diabetes to the point of disease remission in the majority of recently-diagnosed patients; however, associations between fat depots and glycaemic parameters have not been well studied. The objectives of this study were to characterize changes in the intra-abdominal fat depots in patients with type 2 diabetes undergoing bariatric surgery, and to explore associations between specific fat depots and glycaemic response to a mixed meal.

Methods: We conducted a pilot observational study in 18 obese patients with type 2 diabetes who were scheduled to undergo bariatric surgery and followed them for 4 weeks after surgery (week 0-4 of the study). Liver fat content, pancreatic fat content, and abdominal visceral (VAT) and subcutaneous (SAT) adipose tissue volumes were determined by MRI at 0, 2 and 4 weeks. A liquid mixed meal test was also conducted at these time points. Generalized estimating equations were used to explore associations between variables.

Results: Seventeen participants completed the study; 12 underwent gastric bypass and 5 underwent sleeve gastrectomy. The AUCglucose0-150min declined from 1632.9±516.6 (mean±SD) at the pre-surgery visit to 1305.1±404.2 min*mmol/L at 4 weeks (p=0.02; 20% decrease). The percent liver fat content decreased from 18.2±7.7% before surgery to 10.2±3.6% at week 4 (p<0.0001; 44% decrease), while the pancreatic fat content did not change significantly (p=0.50). The intra-abdominal VAT and SAT volumes declined by 452.7±282.2 cm³ (p<0.0001 week 4 vs 0; 24% decrease) and 304.4±268.5 cm³ (p=0.0003 week 4 vs 0; 7% decrease), respectively. Lower pancreatic fat content (β coefficient -204.1 (95% CI -217.4, -190.9) min*mmol/L per 10% increase) and higher VAT (β coefficient 268.5 (95% CI 268.2, 268.7) min*mmol/L per 1000 cm³ increase), but not liver fat content (p=0.14) and SAT (p=0.27), were found to be significant univariate predictors of the AUCglucose0-150min measured at 3 time points.

Conclusions: There are substantial declines in liver fat and VAT in patients with type 2 diabetes shortly after bariatric surgery which are accompanied by reductions in glucose excursions after a meal. The exploratory association findings need to be confirmed in larger studies.
IS THE RELATIONSHIP BETWEEN ADIPOSOPATHY AND INSULIN RESISTANCE IN OBESE WOMEN AFFECTED BY AEROBIC TRAINING?

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Background and objectives: Menopause is often associated with metabolic disorders. The concept of adiposopathy is described as a dysfunction of adipose tissue that can lead to dyslipidemia, insulin resistance (IR) and hyperglycemia. Modified adipocyte secretions can contribute to these complications and the most frequently mentioned adipokines are adiponectin (Acrp30) and leptin. Although the Acrp30/leptin ratio is a valuable marker of adiposopathy, its relative contribution to the prediction of IR remains to be clarified in different populations. The objectives of this study were to validate the relationship between adiposopathy and IR in sedentary women characterized by comparable obesity but different menopausal status, and to determine the impact of aerobic training on this relationship.

Methods: 15 pre- and 14 post-menopausal women (49 ± 2 and 52 ± 2 years, p<0.001) with BMI ranging from 29 to 35 kg/m², walked for 16 weeks, 3 times/week, 45 min, at 60% of their heart rate reserve. Anthropometry, body composition, VO₂max, fasting plasma glucose and insulin levels (and HOMA-IR), fasting lipid-lipoprotein profile and circulating levels of pro- vs. anti-inflammatory markers (leptin and CRP vs. Acrp30) were measured before and after the training program.

Results: The Acrp30/leptin ratio was positively associated with VO₂max and plasma HDL-CHOL (0.37<r<0.56; p<0.05), but negatively associated with BMI, fat mass, waist circumference, HOMA-IR and CRP (-0.49<r<-0.66; p<0.05) before our intervention, irrespective of the group. These associations remained significant after training. Multiple regression analyzes in all subjects and taking into account fat mass or waist circumference, as well as plasma levels of CRP, HDL-CHOL, and triacylglycerols revealed that the strongest independent predictor of IR was adiposopathy (partial r² = 0.37; p<0.001). Despite body weight and fat mass losses, reduced waist circumference and improved VO₂max (p<0.05), the HOMA-IR and Acrp30/leptin ratio did not change in response to training (1.21±0.82 vs. 1.17±1.14, and 0.194±0.138 vs. 0.213±0.167, respectively).

Conclusions: Adiposopathy appears as an interesting biological marker of IR in obese women, regardless of their menopausal status. As a result of body weight loss induced by aerobic training, the lack of changes in both adiposopathy and IR reinforces the potential mechanistic link between these variables.
PROSTAGLANDIN SYNTHESE AKR1B1 ADIPOSE TISSUE EXPRESSION AS A MARKER OF METABOLIC DYSFUNCTION

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Background and objectives: Prostaglandins F₂α and E₂ (PGF₂α and PGE₂) are lipid mediators promoting inflammation which have been shown to modulate adipose tissue (AT) function by inhibiting preadipocyte differentiation. Our group has shown that the PGF synthase AKR1B1 has a predominant role in PGF₂α synthesis by human preadipocytes in response to inflammatory cytokines. Moreover, we reported that expression of this enzyme, particularly in subcutaneous AT, was positively associated with indices of visceral obesity including high visceral AT area and omental adipocyte hypertrophy. Our objective was to assess whether subcutaneous AT AKR1B1 mRNA expression is also a marker of systemic metabolic dysfunction.

Methods: Omental and subcutaneous fat samples were obtained from 46 lean to severely obese women (age: 37.6-54.5 years, BMI: 19.5-50.1 kg/m²). Whole AT mRNA expression levels of AKR1B1 were quantified by realtime RT-PCR. Markers of glucose homeostasis (fasting plasma glucose, plasma insulin and HOMA insulin resistance index (HOMAir)) and plasma lipids (total cholesterol, HDL and LDL cholesterol, total cholesterol/HDL cholesterol ratio and triglyceride levels) were measured. Omental adipocyte diameter was assessed after collagenase digestion. Abdominal AT areas were measured by computed tomography.

Results: Subcutaneous AKR1B1 mRNA expression levels were positively correlated with total triglycerides (r=0.46, p<0.002), the total cholesterol/HDL cholesterol ratio (r=0.33, p<0.03), plasma glucose (r=0.36, p<0.02), plasma insulin (r=0.58, p<0.001) and HOMAᵦ index (r=0.58, p<0.001), and were negatively associated with HDL cholesterol concentrations (r=-0.43, p<0.005). After statistical adjustment for visceral AT area, correlations remained significant for plasma glucose, insulin and HOMAᵦ index (p<0.05 for all). Trends were observed for total triglyceride and HDL cholesterol levels (p<0.09 for both). Statistical adjustment for average omental adipocyte diameter did not affect associations between AKR1B1 mRNA expression and plasma insulin, HOMAᵦ index, and HDL cholesterol (p≤0.01 for all), whereas a trend remained for blood glucose (p<0.09).

Conclusions: Subcutaneous AT AKR1B1 expression is elevated in women with visceral obesity and omental adipocyte hypertrophy. It is also positively related to altered glucose-insulin homeostasis and adverse blood lipid profile. Most of these associations are independent of visceral fat accumulation or omental adipocyte hypertrophy, suggesting that AKR1B1 may represent a marker of metabolic dysfunction.
SESSION 1 - Abdominal Obesity/Body Fat Distribution - Adipokines - Adipose Tissue - Cancer
85-IYNN-132

PROSTAGLANDIN E RECEPTOR SUBTYPE 4 (EP4) DEFICIENCY ENHANCED
MULTILOCULAR FAT CELL FORMATION AND MITOCHONDRIAL BIOGENESIS AND
FACILITATED WAT REMODELING

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Background and objectives: A salient feature of chronic β3-adrenergic agonist activation is pronounced remodeling of white adipose tissue (WAT), which includes the transformation of the lipid vacuole from unilocular into multilocular appearance and mitochondrial biogenesis with resulting elevation in whole-body metabolic rate. Although stimulation of prostaglandin E receptor subtype 4 (EP4) affect metabolic functions, no available information focuses on its role in WAT remodeling. The aim of this study was to investigate whether or not genetic ablation of EP4 affects WAT remodeling mediated by β3-adrenergic stimulation.

Methods: EP4+/+ and EP4−/− mice received either saline or CL316,243 (a selective β3-adrenergic agonist, 1mg/kg/day, intraperitoneally) for ten days. The effect of EP4 deficiency on energy expenditure, fat tissues morphology, mitochondrial biogenesis and activity in mice with or without CL316,243 treatment were compared. The possible regulatory mechanisms underlying the effect of EP4 deletion on WAT remodeling were also investigated.

Results: The elevation in metabolic rate caused by chronic CL316,243 treatment was greater in EP4−/− mice. CL316,243 fragmented the unilocular lipid droplet into multilocular lipid vacuoles, increased mitochondrial biogenesis and its activity. These changes were amplified in mice with EP4 deficiency and were selectively seen in subcutaneous WAT. The expression of fat specific protein 27 (FSP27), a protein that promote fusion of triglycerides and formation of unilocular lipid droplet were diminished, while the expression of AMP-activated protein kinase (AMPK), the upstream regulator of FSP27, was enhanced in EP4 deficient mice. WAT explants treated with EP4 activators (CAY10580 or prostaglandin E2) exhibited a decrease in phosphorylated AMPK expression, while pre-treatment with the selective EP4 antagonist L161,982 prevented such decrease. Treatment with CL316,243 reduced the mRNA expression of FSP27, and such decrease was further potentiated by L161,982. Pre-treatment with compound C, an inhibitor of AMPK, reversed the CL316,243-mediated down-regulation of FSP27 expression in a concentration-dependent manner.

Conclusions: The current findings imply that in subcutaneous WAT, EP4 regulates the extent of remodeling and that its absence represses FSP27, and promotes AMPK expression, provokes greater CL316,243-induced formation of multilocular adipocytes and enhances mitochondrial biogenesis. These effects contribute to an overall increase in whole-body metabolic rate in EP4 deficient mice.
SESSION 1 - Abdominal Obesity/Body Fat Distribution - Adipokines - Adipose Tissue - Cancer
85-3TVW-242

ALLOGRAFT-INFLAMMATORY FACTOR-1 GENE EXPRESSION IN BREAST LESIONS AND BREAST ADIPOSE TISSUES

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Background and objectives: Allograft-Inflammatory Factor-1 (AIF1) is a crucial mediator in the inflammatory response mainly produced by macrophages. AIF1 has both been reported to play a significant role in breast cancer and in obesity, although its mechanism of action is incompletely understood. Therefore, our aim was to investigate the potential function and expression of this gene in breast lesions of varying severity and in the breast adipose tissue. We also investigated the potential effect of omega-3 (n-3) fatty acids, known for their anti-inflammatory properties, on the expression of AIF1.

Methods: "RNA-sequencing" methodology was used to characterize the transcriptional profile of women from high-risk families. RNA was extracted from immortalized lymphoblastoid cell lines of 115 women from high-risk families (BRCA1/BRCA2 or without BRCA1/2 mutations (BRCAX)). Statistical and bioinformatics analysis identified significantly and differentially expressed transcripts between the different groups. Specifically, certain splice variants of the gene AIF1 appear to be differentially expressed between affected and unaffected sisters from BRCAX families. These transcripts are now being studied in breast cancer cell lines, breast tissues, and breast adipose tissues. BRCAX cells treated with various concentrations of EPA and DHA for 24, 48 and 72 hours were also studied.

Results: Gene expression analysis in mammary lesions of varying severity indicates that AIF1 is more expressed in breast lesions tissues compared with epithelial cell lines. AIF1 also seems to be more expressed in the less severe breast lesions, and this expression appears to decrease with the increased severity of the breast lesions. Preliminary analysis on breast fat samples also showed that the AIF1 gene is highly expressed in the mammary fat and monocytes. Analysis with clinical and pathological data revealed correlations between AIF1 expression and metabolic parameters such as the age, weight and waist-hip ratio. Preliminary analysis with EPA-DHA treated cells showed a significant decrease of AIF1 expression when treatment with 40µM of DHA for 24 hours was applied. Further analysis is currently underway to better evaluate the potency of omega-3 fatty acids to decrease AIF1 expression.

Conclusions: AIF1 seems to be involved in the first malignant stages of breast carcinogenesis and to play an important role in the tumour microenvironment.
SESSION 2 - Cardiometabolic Risk
85-N4NK-82

EFFECTS OF INTENSITY AND AMOUNT OF EXERCISE ON MEASURES ON INSULIN AND GLUCOSE: ANALYSIS OF INTER-INDIVIDUAL VARIABILITY

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Background and objectives: Variability in glucose and insulin response to exercise is a largely neglected phenomenon. Here we analyze this variability by measuring the rate of response defined as the number of individuals with improvement in glucose and insulin values beyond the day-to-day variability of measurement. The purpose of this study is to determine the separate effects of exercise amount and intensity on the rate of response for glucose and insulin variables.

Methods: Participants were 171 sedentary, middle-aged abdominally obese adults who completed at least 90% of 5 weekly exercise sessions prescribed over a 24-week intervention. Participants were randomly assigned to (1) no-exercise control (n=51), (2) low-amount, low-intensity exercise (LALI; n=38), (3) high-amount, low-intensity exercise (HALI; n=52), or (4) high-amount, high-intensity exercise (HAHI; n=30). Two-hour glucose level, insulin area under the curve (AUC), and fasting insulin were measured at 16 and 24 weeks in response to a 2-hour, 75g oral glucose tolerance test. Biological variability for these measures was calculated to be ±2.2 mmol/L, ±940.2 pmol/L, and ±38.9 pmol/L, respectively.

Results: At 24 weeks, the rate of response for 2-hour glucose was 2.0%, 13.2%, 5.8%, 13.3% in the control, LALI, HALI, and HAHI groups, respectively. The rate of response for insulin AUC was 12.0%, 21.6%, 25.0%, 20.0% in the control, LALI, HALI, and HAHI groups, respectively. The rate of response for fasting insulin was 11.8%, 15.8%, 15.4%, 6.7% in the control, LALI, HALI, and HAHI groups, respectively. The rate of response was not different between control and any of the exercise groups for 2-hour glucose, insulin AUC, and fasting insulin (p>0.05). Exposure to exercise did not affect the rate of response for 2-hour glucose or fasting insulin between 16 and 24 weeks (p>0.05). Exposure data was not available for insulin AUC.

Conclusions: There was substantial variability of response for measures of insulin and glucose that was not reduced by increasing exercise amount or intensity, where a maximum of 25% of participants improved in these measures beyond the day-to-day variability. This observation underscores the importance of accounting for the variability of measurement when interpreting treatment efficacy for a given individual.
SESSION 2 - Cardiometabolic Risk
85-3562-132

ACCURACY AND COMPARISON OF TWO CARDIOVASCULAR RISK EQUATIONS IN ATHEROSCLEROTIC CARDIOVASCULAR DISEASES EVALUATED IN ASYMPTOMATIC SUBJECTS IN MEXICO

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Background and objectives: Atherosclerotic Cardiovascular Diseases (ASCVD) are leading causes of death in Latin America and Mexico, however there is insufficient information regarding reliability and precision of available risk scores in classification of high risk groups in outpatients. The aim of the study is to estimate and compare the accuracy of two cardiovascular risk scores for classification of prevalent ASCVD in asymptomatic subjects.

Methods: Cross-sectional study From January 2013 to October 2016 in four centers. We estimated the 10 – year risk with Framingham risk score (FRS) and the 2013 American College of Cardiology/American Heart Association (2013 ACC/AHA) risk equation. Previous ASCVD was defined as past history of myocardial infarction, stroke, percutaneous coronary intervention or coronary artery bypass grafting. We estimated sensitivity, specificity, predictive values, area under the curve (AUC) and net reclassification index (NRI) for the 2013 ACC/AHA and FRS.

Results: Five hundred and ninety one patients with a mean age of 54 years (SD ± 10.8), 40.61% male, Body Mass Index of 28.53 m/kg² (SD ± 5.67), 19.28% current or previous smoker. Global ASCVD prevalence was 3.72% with ischemic heart disease and previous stroke in 2.71 and 1.18% respectively. High risk patients for FRS and 2013 ACC/AHA were 7.45 and 32.49%, respectively. Standard cut-off points for high risk patients for FRS (>20%) showed a sensibility, specificity, PPV and NPV of 27.3, 93.1, 13.6 and 97.1%, respectively; The 2013 ACC/AHA (>7.5%) yielded a sensibility 68.2, specificity 68.9%, PPV 7.7% and NPV of 98.2%. The AUC of 2013 ACC/AHA and FRS were 0.71 (CI 95% = 0.57 0.84) and 0.62 (CI 95% = 0.47 0.77), respectively, (p<0.01). Estimated NRI = 24% (p=0.1).

Conclusions: The 2013 ACC/AHA equation showed higher sensitivity and global performance. However there was a loss in specificity compared to FRS. The 2013 ACC/AHA equation may improve classification of prevalent ASCVD, especially in false negatives cases not identified by FRS.
SESSION 2 - Cardiometabolic Risk
85-KFUC-142

TARGETING AND ASSESSING LIFESTYLE COMPONENTS IN A CARDIOMETABOLIC HEALTH INTERVENTION: IMPACT ON RESTING AND EXERCISE BLOOD PRESSURE

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Background and objectives: Lifestyle promotion is part of the prevention of societal chronic diseases like hypertension and obesity. Understanding how the promotion of a healthy lifestyle impacts on blood pressure at rest and during exercise can help blood pressure control intervention strategies. Therefore, we aim to assess the impact of a workplace lifestyle intervention on resting and submaximal exercise blood pressure (BP).

Methods: The “Grand Défi Entreprise” is a 3-month cardiometabolic health intervention where participating employees are asked to move more, eat better and stop smoking. Before and after the intervention, nutritional quality and physical activity level were assessed through questionnaires, resting blood pressure was measured as well as waist circumference (n = 1,448). A submaximal exercise test including a standardized stage (3.5 mph, 2 % slope) was performed along with a blood lipid profile in a subgroup of participants (n = 879). Changes in BP values at rest and during the standardized exercise stage in response to the 3-month intervention were assessed and correlations between these changes and those of key lifestyle components were analyzed.

Results: After 3 months, employees lowered their systolic BP (SBP) and their diastolic BP (DBP) at rest (p<0.001). In both sexes, improvements in resting SBP were correlated with changes in waist circumference, physical activity level, and nutritional quality (p<0.03) while for resting DBP, significant correlations were found only in men for waist (p<0.04) and nutritional quality (p<0.01). While exercise DBP was lowered in both sexes (p<0.01), only men improved their exercise SBP (p<0.001). Cardiorespiratory fitness was the only outcome associated with the improvement of exercise SBP and DBP in both sexes (p<0.04). Even though women did improve their physical activity level (p<0.05), only men showed a significant improvement of their cardiorespiratory fitness (p<0.001).

Conclusions: A workplace intervention assessing/targeting lifestyle can lower resting and exercise BP in both sexes. Exercise SBP was not reduced by the program in women, which could be explained by the lack of improvement in cardiorespiratory fitness in women compared to men.
CONTRIBUTION OF CARDIORESPIRATORY FITNESS AND VISCERAL ADIPOSITY TO CARDIOMETABOLIC RISK IN WOMEN AND MEN

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Background and objectives: Cardiorespiratory fitness (CRF) and visceral adiposity influence many cardiometabolic risk (CMR) markers. However, their respective contributions to CMR according to sex remain unknown. Our objective is to quantify the respective contributions of cardiorespiratory fitness and visceral adiposity to the CMR profile in women and men.

Methods: Participants (141 women and 180 men) without symptoms of cardiovascular diseases (CVD) from the Visceral obesity/ectopic fat and non-invasive markers of atherosclerosis: a cardiometabolic-cardiovascular imaging (CMCV) study were evaluated. Tests and measures were performed (anthropometric measures, lipid profile, oral glucose tolerance test, resting heart rate and blood pressure, submaximal and maximal treadmill exercise tests). Data on physical activity level (PAL) were also collected through questionnaires and measures from pedometers. Visceral (VAT) and subcutaneous (SAT) adipose tissue were measured from magnetic resonance images. Subgroup analyses were performed in women and men according to VAT and CRF to evaluate their influence on CMR. Multivariate regression analyses were performed to evaluate the respective contributions of VAT, CRF and PAL to CMR.

Results: In women, high VAT had a greater influence on the variance of lipid and glycemic parameters than low CRF: LDL-C ($R^2=0.174$, $p<0.001$), HDL-C ($R^2=0.105$, $p<0.001$), triglycerides ($R^2=0.286$, $p<0.001$), glycemia at 120 minutes ($R^2=0.121$, $p<0.001$) and insulin at 120 minutes ($R^2=0.276$, $p<0.001$). In men, low CRF explained a greater proportion of the variance of these variables than high VAT: LDL-C ($R^2=0.057$, $p<0.01$), HDL-C ($R^2=0.123$, $p<0.001$), triglycerides ($R^2=0.173$, $p<0.001$), glycemia at 120 minutes ($R^2=0.172$, $p<0.001$) and insulin at 120 minutes ($R^2=0.227$, $p<0.0001$).

Conclusions: In women, VAT seemed to have a greater influence on markers of CMR linked to dyslipidemia and dysglycemia than CRF, whereas the opposite phenomenon was observed in men. These findings further support the need to evaluate both visceral adiposity and CRF as drivers of CMR.
IMPACT OF A 1-YEAR LIFESTYLE MODIFICATION PROGRAM ON PLASMA LIPOPROTEIN(A) LEVELS IN PATIENTS WITH CORONARY ARTERY DISEASE

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Background and objectives: Lipoprotein(a) (Lp[a]) is one of the strongest genetic risk factor for coronary artery disease (CAD). Although the variation in plasma Lp(a) levels has been shown to be strongly influenced by genetics, whether Lp(a) is associated with an altered cardiometabolic risk profile and whether lifestyle changes could improve Lp(a) levels in patients with coronary artery disease is unknown. The aim of the study was to determine if patients with high Lp(a) levels were characterized by a deteriorated cardiometabolic risk profile and whether a 1-year lifestyle modification program aiming at increasing physical activity levels and improve diet quality could decrease Lp(a) levels in post coronary artery bypass graft (CABG) patients.

Methods: A total of 80 men, aged between 35 and 80 years old, and undergoing CABG surgery participated in a 1-year lifestyle modification program aiming at achieving a minimum of 150 minutes of aerobic physical activity weekly at moderate to vigorous intensity (50-80% maximal heart rate) and improving diet quality. Lp(a) levels were measured using immunoturbidimetry on a Cobas analyzer before and after the 1-year intervention. Anthropometric variables, inflammatory markers levels, a completed lipoprotein-lipid profile including cholesterol efflux capacities and PCSK9 levels as well as measurements of visceral, subcutaneous, epicardial and pericardial adipose tissue (AT) using magnetic resonance imaging were also obtained before and after the 1-yr intervention as well as an oral glucose tolerance test and a maximal exercise treadmill test.

Results: Of all the cardiometabolic markers measured, none were found to be significantly different across Lp(a) tertiles (all p>0.05). Following the intervention, Lp(a) levels were not significantly modified (80.4 (17.1-43.9) nmol/L vs. 77.2 (13.6-42.2) nmol/L, p=0.206).

Conclusions: Results of this study suggest that increasing physical activity levels and improving diet quality does not influence plasma Lp(a) level in patients with CAD. Whether the presence/absence of other risk factors influence cardiovascular risk associated with high Lp(a) levels is currently under investigation.
PREVALENCE AND SEX-SPECIFIC DISTRIBUTION OF CARDIOVASCULAR RISK FACTORS AMONG UNIVERSITY STUDENTS IN URBAN-RURAL AREAS OF THE DEMOCRATIC REPUBLIC OF THE CONGO

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Background and objectives: A recent qualitative study on modifiable cardiovascular risk factors (MCVRF) in Sub-Saharan African University students suggested sex differences in knowledge and beliefs regarding what constitutes a healthy lifestyle. However, the extent to which this is reflected in sex-specific distribution of MCVRF among Sub-Saharan African students have not been fully evaluated. The objective of this study was to assess the prevalence and the sex-specific distribution of some MCVRF among students at University of Kikwit in the Democratic Republic of the Congo.

Methods: Descriptive cross-sectional study of 780 students of University of Kikwit (62.2% men) between January and March 2016. Data included physical measurements (blood pressure, weight, height, waist circumference, hip circumference) as well as lifestyle factors (smoking, alcohol intake) and medical antecedents. The MCVRF assessed were hypertension (blood pressure ≥ 140/90 mm Hg or the use of antihypertensive medication), high pulse pressure (≥ 63 mm Hg), overweight and obesity (body mass index 25-29.9 kg/m² and ≥ 30 kg/m², respectively), smoking, alcohol intake and abdominal obesity which was assessed using both the International Diabetes Federation’ waist circumference (IDF-WC, ≥ 94 cm in men, ≥ 80 cm in women) and the World Health Organization’ waist-to-hip ratio (WHO-WHR, > 0.90 in men, > 0.85 in women) cut-off values.

Results: The median age of students was 23 years, interquartile range (21-25 years). Identified MCVRF were: alcohol intake (53.1%), overweight (16.4%), abdominal obesity (10.4% and 46.5% using the IDF-WC and the WHO-WHR criteria, respectively), smoking (8.1%), hypertension (7.6%), high pulse pressure (6.4%) and obesity (1.9%). Compared to females, males had higher prevalence of hypertension (9.9% vs 3.7%; p=0.002), smoking (10.7% vs 3.7%; p=0.001) and alcohol intake (58.4% vs 44.4%; p<0.001), while females had higher prevalence of abdominal obesity whether assessed by the IDF-WC (23.1% vs 2.7%; p<0.001) or the WHO-WHR (65.1% vs 35.3%; p<0.001) thresholds.

Conclusions: This study suggests a sex-specific distribution of several modifiable cardiovascular risk factors in university students at University of Kikwit. Design of sex-specific, student-targeted health promotion programs may be warranted to reduce the prevalence of risk factors and the subsequent burden of cardiovascular diseases.
SESSION 2 - Cardiometabolic Risk
85-CRVO-242

NEIGHBOURHOOD ENVIRONMENT AND ITS ASSOCIATION WITH CHILD BLOOD PRESSURE IN QUEBEC: FINDINGS FROM THE QUALITY STUDY

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Background and objectives: Child obesity has reached unprecedented levels, prompting efforts to better understand the role of its modifiable determinants, such as neigbourhood environments. We examined the association of neighbourhood with child blood pressure two years post baseline among a cohort of n=630 Canadian children aged 8-10 years living in Quebec, who participated in an ongoing longitudinal study.

Methods: Geographic Information Systems produced built environment measures and linked environment data with individual and family measures: demographic, anthropometric, physical (in)activity, blood tests, and family history. A multinomial logistic regression model was used to analyze associations of a neighbourhood deprivation index, a neighbourhood street network buffer walkability index (with 1000 m radii around children’s residences), and neighbourhood levels of air pollution with child’s seated systolic and diastolic blood pressure, after controlling for covariates (child’s age, sex, puberty status, parental education, family income, weight status, and blood pressure at baseline). Age, sex, and height-specific z scores for systolic and diastolic blood pressure were expressed into tertiles: low, medium, and high blood pressure. Neighbourhood air pollution was measured based on postal code levels of particulate matter with a fine diameter of 1-2.5 microns (PM2.5) and of ground level ozone (O3). Analyses were conducted using R and SAS.

Results: The mean value for O3 was 31.15 ppb (SD=1.86) and for PM2.5 was 10.98 µg/m³ (SD=2.51). A one point increase in the O3 score of a child’s neighbourhood was associated with a decrease by 0.19 units in the child’s log-odds for having medium rather than high blood pressure (OR=0.83, 95%CI 0.71,0.96, p=0.01). Also, a one point increase in the PM2.5 score of a child’s neighbourhood was associated with a decrease by 0.14 units in child’s log-odds for having low versus high blood pressure (OR=0.85, 95%CI 0.75,0.97, p=0.02). No other environmental measures were associated with blood pressure.

Conclusions: Children suffering from high blood pressure are vulnerable to long term health risks. Because children living in neighbourhoods with higher air pollution levels are more likely to have higher blood pressure, interventions promoting a reduction of air pollution though traffic volume taming may help reduce children’s health risks.
DISTINCT ROLES OF DIETARY FAT AND SUGAR IN THE DEVELOPMENT OF OBESITY, INSULIN RESISTANCE AND CARDIAC DYSFUNCTION IN LDLR/- MICE

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Background and objectives: Increased consumption of high caloric foods has been associated with the obesity epidemic and higher incidence of cardiometabolic disease, but the specific role of dietary fat and sugar remains unclear. There is growing evidence that high intake of added sugar contributes to cardiovascular disease (CVD) but whether this is independent from high fat content remains to be established. The specific roles of dietary sugar and fat in promoting the development of atherosclerotic lesions are not well understood. To this end, we examined the impact of high sucrose intake on features of metabolic syndrome and CVD in an atherosclerotic mouse model.

Methods: Atherosclerotic LDLr/- ApoB100/100 (LRKOB100) mice were fed either a low-fat/high-sucrose (LFHS) or a high-fat/low-sucrose (HFLS) diet supplemented with 0.2% cholesterol for 24 weeks. Insulin (ITT) and oral glucose tolerance tests (OGTT) were conducted at week 17 and 19, respectively. Echocardiography was performed at week 0, 12 and 24. Blood was collected at week 21 for determination of plasma triglycerides (TG), cholesterol and lipoproteins quantification, and at week 24 for lipopolysaccharide (LPS) and inflammatory cytokines evaluation. Atherosclerotic lesions were quantified according to the en face technique.

Results: Body weight gain and whole-body fat mass were greater in HFLS-fed vs LFHS-fed LRKOB100 mice. HFLS feeding increased liver weight and TG deposition and raised plasma TG, cholesterol, while decreasing plasma HDL when compared to LFHS feeding. LRKOB100 mice fed the HFLS diet were more insulin resistant than their LFHS-fed counterparts as revealed by higher insulin concentrations during OGTT. Unexpectedly, while LFHS-fed mice were less prone to metabolic impairments, they showed much greater development of atherosclerosis as revealed by extensive aortic plaque formation. Consistent with atherosclerotic plaque formation, echocardiography further revealed that LFHS-fed LRKOB100 mice developed left ventricle eccentric hypertrophy (LVEH) after only 12 weeks of feeding compared to HFLS-fed mice.

Conclusions: Our results indicate that dietary sugar and fat have distinct roles cardiometabolic diseases development in LRKOB100 mice. While high fat intake promotes obesity and metabolic alterations, high sugar intake promotes atherosclerosis and cardiac dysfunction despite reduced impact on body weight gain, insulin resistance and dyslipidemia.
EXERCISE CARDIAC HEMODYNAMICS BUT NOT FITNESS IS ASSOCIATED WITH COGNITIVE FUNCTION IN HEART FAILURE AND HEART TRANSPLANTED PATIENTS

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Background and objectives: End-stage chronic heart failure (CHF) often leads to heart transplantation. Both CHF and heart transplant recipients (HTR) demonstrate impaired VO$_2$peak, maximal cardiac output and cerebral oxygenation and perfusion during exercise as compared to age-matched healthy subjects (AMHC). The relationship between functional capacity, cardiac hemodynamics and cognitive function across these different patients has been poorly studied. We aimed to compare cognitive function between AMHC, HTR and CHF and if fitness and exercise cardiac hemodynamics would be independently associated with cognitive function.

Methods: Nine stable CHF (64.67±7.6), 12 stable HTR (55.8±11.7 years) and 12 AMHC (57.3±12.2 years) were evaluated for this pilot study. Time post-transplantation in HTR was 6.8±5.4 years. Cardiac hemodynamics (evaluated by impedance (cardiac index (CI), cardiac output (CO) and left cardiac work index (LCWi)), VO$_2$max (ml/kg*min) and peak power output (PPO) were measured during a maximal cardiopulmonary exercise test. Cognitive evaluation involved: 1) Psychomotor speed (PS); 2) Executive function (EF); and 3) Verbal recall (VR). We used mixed-model multiple regressions to evaluate independent predictors of the composite scores adjusting for age and education.

Results: The ANOVA demonstrated that all 3 composite scores were higher in healthy subjects when compared to CHF patients. HRT was different to AMHC only for executive function score (p=0.039). In univariate analyses, all hemodynamic and fitness parameters correlated significantly with all 3 composite scores (r = 0.47 – 0.71; p<0.007). Multiple regression analyses demonstrated that higher cardiac index reserve was independently associated with better psychomotor speed (p<0.0001) and verbal recall (p=0.013), while higher left cardiac work index reserve was independently associated with better EF (p=0.0001). Interestingly, fitness parameters including VO$_2$max and PPO were not associated with any composite score.

Conclusions: Our results suggest that CHF patients have worst cognitive function when compared to AMHC. HRT were different just for executive function when compared to AMHC, therefore not different to CHF concerning to composite scores in our preliminary results. Solely exercise hemodynamics reserve parameters were independent predictors of cognitive function.

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JMJD3 REGULATES THE EXPRESSION OF AUTOTAXIN

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Background and objectives: Autotaxin (ATX), which is encoded by the ENPP2 gene, is known to be a strong promoter of inflammation. The circulating level of ATX is increased in obese patients and promotes the development of calcific aortic valve disease. However, the regulation of ATX expression remains elusive. The objective of this study was to examine the molecular mechanism involved in the regulation of ATX expression.

Methods: HEK293T cells were treated with 100 ng/ml of LPS for 6 hours and functional characterization of gene expression and promoter activation were carried out. Chromatin immunoprecipitation coupled with quantitative PCR (ChIP-q-PCR) has been used to study the binding of p65, a member of NF-kB family, on ATX promoter and to evaluate histone-related modifications.

Results: In reporter assay, LPS increased the activity of a construction containing the promoter region of ATX. LPS also promoted the expression of mRNA encoding for ATX, which was negated by Bay 11-7085, an inhibitor of IκB kinase (IKK), and was robustly increased by the overexpression of p65. Following a treatment with LPS, we observed by using ChIP-q-PCR an enrichment of p65 at two kB consensus sequences in the ATX promoter and in one site near TSS. Simultaneously, the level of H3K27me3, a histone repressive mark, was decreased after LPS treatment. Knockdown of EZH2 and H3K27me3 demethylase JMJD3 with small interfering RNA (siRNA) positively modulated and prevented LPS-mediated expression of ATX respectively. Moreover, the recruitment of p65 to ATX promoter was not affected by a knockdown of JMJD3.

Conclusions: LPS promotes the expression of ATX in HEK293T cells through a NF-kB pathway and an epigenetic mechanism involving H3K27me3, EZH2 and JMJD3.
Background and objectives: Traditional modifiable cardiovascular risk factors (hypertension, hyperlipidemia, obesity, diabetes, smoking) are by definition important predictors of cardiovascular events, especially when clustered. Nevertheless, it is regularly argued that these risk factors alone weakly explain the occurrence of coronary artery disease (CAD). Carotid artery features have been suggested to improve cardiovascular risk classification beyond traditional risk factors alone. We measured carotid morphology and atherosclerosis burden among men without clinical carotid disease, but presenting a graded burden of cardiovascular risk.

Methods: We recruited men 1) without CAD or risk factors (NRF); 2) without CAD, but with cardiovascular risk factors (CVRF); 3) with long-standing chronic stable angina (CSA); and 4) with acute ST-segment elevation myocardial infarction (STEMI), previously unknown for CAD. Bilateral magnetic resonance imaging, centered on the carotid bifurcation (total coverage of 48 mm), was performed for all participants.

Results: Cardiovascular risk burden progressed across NRF to CVRF to CSA to STEMI cohorts. Furthermore, carotid artery wall volume—a marker of atherosclerosis burden—increased progressively as the category of cardiovascular risk increased (p<0.001). The prevalence of carotid plaque (presence vs. absence) was significantly greater in CAD patients (combining CSA and STEMI) compared to CAD-free participants (combining NRF and CVRF) (p<0.05). However, the STEMI cohort alone did not have significantly greater carotid plaque prevalence than CAD-free participants. Thus, the presence of carotid atherosclerotic plaque alone does not accurately classify clinical cardiovascular risk category. Nevertheless, markers of carotid atherosclerosis burden, including carotid artery normalized wall index and maximum wall thickness, were significantly greater in CAD patients compared to CAD-free participants (p<0.001 for both associations). Receiver-operating characteristic curves indicated that both carotid artery normalized wall index and maximum wall thickness are highly accurate predictors of acute and chronic clinical CAD.

Conclusions: In the present study, participants with CAD, whether chronic or acute, possess greater carotid plaque burden. However, the presence of carotid plaque alone is not sufficient to predict clinical risk category. Ultimately, carotid artery normalized wall index and maximum wall thickness are highly accurate predictors of acute and chronic clinical CAD. Longitudinal studies are required to confirm this transversal data.
SESSION 3 - Cardiovascular Disease - Childhood Obesity - Clinical Cardiology
85-ISIX-142

HIGH-RISK ATHEROSCLEROSIS FEATURES: A SYSTEMIC PROCESS?

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Background and objectives: The presence of carotid atherosclerosis in patients with coronary artery disease (CAD) supports the systemic nature of atherosclerosis. However, it is not established if atherosclerosis vulnerability, characterized by high-risk features including greater lipid burden, is also a systemic phenomenon. We compared carotid atherosclerosis features in men with acute/vulnerable CAD vs. men with stable CAD.

Methods: Fifty men suffering from a first acute ST-segment elevation myocardial infarction (STEMI), previously unknown for CAD, were matched for age with fifty men suffering from long-standing symptomatic chronic stable angina (CSA). Bilateral magnetic resonance imaging (MRI), centered on the carotid bifurcation (total coverage of 48 mm) was performed in all patients. To capture carotid atherosclerosis features in the acute stage of CAD, MRI was performed within 48 hours of hospital admission for STEMI patients. Measurements of carotid artery wall lipids, hemorrhage, calcification, loose matrix and fibrous tissue were determined on four co-registered sequences (T1W, T2W, PDW and TOF).

Results: STEMI patients (58.3 ± 8.9 years) had greater cardiovascular risk compared to CSA patients (59.0 ± 8.8 years), with a 10-year Framingham risk score of 27.6 ± 16.1% vs. 19.1 ± 9.1% (p=0.002), respectively. However, CSA patients benefitted from superior pharmacological management since unlike STEMI, they were already known for CAD. Despite this, carotid atherosclerosis features were similar for acute and chronic CAD patients in the internal or bifurcation segments. Meanwhile, in the common carotid artery, STEMI patients presented a significantly greater volume and proportion of lipids compared to CSA patients (8.00 ± 14.59 mm3/4 mm vs. 2.35 ± 3.17 mm3/4 mm, p=0.012; 3.57 ± 4.69% vs. 1.31 ± 1.99%, p =0.003), while all other components were present in a similar proportion in both cohorts. Ultimately, 64.0% of STEMI patients presented lipids in their carotid wall vs. 40.8% of CSA patients (p=0.021).

Conclusions: Compared to chronic CAD patients, those with an acute STEMI presented a greater volume of lipids in the carotid wall, suggesting the systemic nature of vulnerable atherosclerosis.
ASSOCIATION BETWEEN EXERCISE-INDUCED HYPERTENSION AND ATEROSCLEROTIC BURDEN IN PATIENTS WITH TYPE 2 DIABETES AND CORONARY ARTERY DISEASE

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Background and objectives: The association between exercise-induced hypertension (EIH) and mortality risk in patients with type 2 diabetes (T2D) and coronary heart disease remains controversial. In apparently healthy men, EIH has been linked with a higher risk of atherosclerosis. Our aim is to assess the association between EIH and atherosclerosis plaque volume in patients with T2D with previous coronary artery bypass graft surgery (CABG).

Methods: One hundred and twenty-three men with T2D and with previous CABG with at least one saphenous vein graft (SVG) were eligible for the study. Atherosclerosis plaque volume was measured by intravascular ultrasound (IVUS) in a SVG segment. Patients underwent maximal treadmill test (Modified Bruce protocol). EIH was defined as systolic blood pressure (SBP) ≥ 220 mmHg and/or diastolic blood pressure (DBP) ≥ 100 mmHg during exercise. Anthropometric measurements were performed and a lipid profile was obtained.

Results: We found no differences in body composition, length of maximal treadmill test and resting blood pressure between patients with (n=35) and without (n=88) EIH. Patients with EIH had higher total cholesterol (4.3±0.8 vs. 3.8±0.7 mmol/L, p=0.002), LDL cholesterol (2.6±0.6 vs. 2.2±0.6 mmol/L, p=0.002) and apolipoprotein B (0.9±0.2 vs. 0.8±0.2 g/L, p=0.005) levels compared to patients without EIH. Atherosclerosis plaque volume was significantly higher in patients with EIH (386±130 mm³ vs. 332±109 mm³, p=0.03). Moreover, atherosclerosis plaque volume was positively associated with SBP during exercise (r=0.23, p=0.02) and negatively associated with length of the maximal test (r=-0.19, p=0.05). No significant associations were observed between atherosclerosis plaque volume and anthropometric traits.

Conclusions: Results of the study show that in patients with T2D and previous CABG, EIH is associated with a higher atherosclerotic burden as measured by IVUS. A maximal treadmill test could represent an additional non-invasive test to identify high-risk patients with atherosclerosis.
ASSOCIATION BETWEEN SLEEP DURATION AND BODY MASS INDEX AMONG US LOW-INCOME PRESCHOOLERS

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Background and objectives: Short sleep has been associated with overweight/obesity in children, adolescents and adults. Few studies have focused on preschoolers (3-5 year olds). The objective was to verify if sleep duration at night was associated with body mass index (BMI) among preschoolers from low-income families.

Methods: African-American and Hispanic parents and their preschoolers (n=228) were recruited from 45 Head Start Centres across three Head Start Districts. Preschoolers’ sleep duration was self-reported by parents using the Children’s Sleep Habits Questionnaire. Their height was measured by trained staff to the nearest 0.1 cm and weight to the nearest 0.1 kg. Gender-specific BMI z scores were calculated using the revised 2000 growth charts from the Centres for Disease Control and Prevention. Food intake at a family diner was measured using digital photography and pictorial records were converted to gram and energy (in kcal) was estimated using Nutrition Data System for Research software. Preschoolers’ television watching (in hours) was self-reported by parents. Parental stress was measured using the short form of the Parenting Stress Index and parental depression was measured using the Centre for Epidemiologic Studies Depression Scale. A linear regression analysis was performed to assess the association between sleep duration and BMI among preschoolers with energy intake at dinner, television watching, parental stress and parental depression as covariates.

Results: Preschoolers’ sleep duration was negatively associated with BMI z scores ($\beta=-0.14; p=0.0333; R^2=0.03$) when controlling for energy intake, television watching, parental stress and depression. Preschoolers who had a normal weight (< 85th percentile) slept longer at night compared to those overweight or obese (≥ 85th percentile) (561.3±109.9 minutes versus 523.1±125.0 minutes, t(221)=2.37; p=0.0187). A greater percentage of preschoolers of normal weight slept between 10 and 13 hours at night as recommended by the National Sleep Foundation (44.1% versus 22.5%, $\chi^2=10.93$; degrees of freedom=2; p=0.0042).

Conclusions: Longer sleep duration appears to be associated with lower BMI among low-income preschoolers, explaining three percent of the variance in BMI z scores. Promoting adequate sleep duration could be added to lifestyle interventions targeting diet and sedentary behaviour to increase their chances of successfully impacting low-income preschoolers’ BMI.
LIFESTYLE HABITS OF CHILDREN EXPOSED OR UNEXPOSED TO GESTATIONAL DIABETES IN UTERO

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Background and objectives: Healthy nutrition and physical activity are critical components for the development of long-term health in children. Given that childhood obesity is an important public health concern and that children born from mothers with gestational diabetes mellitus (GDM) are at high risk of developing cardiometabolic diseases, this study aims to compare lifestyle habits of children exposed (GDM+) vs. those unexposed (GDM-) in utero.

Methods: A total of 106 GDM+ and 54 GDM- children aged between 3 and 12 years were recruited as part of an ongoing cohort study. Dietary intakes were assessed using two 24-hour dietary recalls. Physical activity practice was measured with ActiGraph GT3X accelerometers worn between 4 and 7 days. Daily minutes of moderate to vigorous physical activity was used for analyses. Children were divided into two groups according to their exposure to GDM. GLMs were performed to compare lifestyle habits between groups. Adjustment for age and sex were performed.

Results: Mean age of children was 6.4±2.7 years. Mean energy intake was 1648.7±438.8 kcal and 1783.2±522.1 kcal in the GDM+ and GDM- groups, respectively (p=0.4). Percentage of calories from fat, carbohydrate and protein was 32.0±5.8, 52.0±6.3 and 16.1±3.2 respectively in GDM+ children and 31.4±6.2, 52.9±7.1 and 15.6±3.5 in GDM- children (p>0.05). Mean duration of moderate-to-vigorous activity was 59.0±33.2 and 62.1±30.4 minutes/day in the GDM+ and GDM- subgroups, respectively (p=0.3). Among 5-12 year-old children (n=115), 71.4% of GDM+ and 62.2% of GDM- did not reach the recommendation of 60 minutes of physical activity per day (p=0.3).

Conclusions: GDM+ and GDM- children had similar dietary intakes and daily physical activity. However, a very small proportion of children meet the physical activity recommendation. Efforts need to be made to increase level of physical activity among children, particularly among GDM+ children who are at higher risk of chronic diseases.
CARDIOVASCULAR RISK IN SCHOOLS INVESTIGATED IN THE CITY OF PONTA GROSSA, PARANÁ/BRAZIL

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Background and objectives: The school is an environment of health promotion, having an important role in the formulation of the concept of food of the individual. Monitoring the growth of children makes nutritional evaluation an essential tool for the investigation of preexisting diseases, so we aimed to evaluate the presence of nutritional disorders in schoolchildren in the municipal school system.

Methods: We performed an anthropometric evaluation between May / 2014 and December / 2015, quantifying weight, height and skinfolds in children from municipal schools in the city of Ponta Grossa, Paraná, Brazil, aged 7 to 9 years. Within the age and gender criteria we evaluated the variables BMI, fat percentage and hip waist ratio.

Results: A total of 937 children were included, of which 528 (56.35%) were female and 409 (43.65%) were male. Eutrophy was observed in 560 children (59.76%), thinness in 20 (2.13%) and marked thinness in 5 (0.53%); In the evaluation of overweight we had 106 children (11.31%) overweight, 37 (3.94%) with obesity and 209 (22.30%) with severe obesity. Within the fat percentage analysis (%G) a variation of 6.74% to 41.61%G was observed, with a median of 23.55% and a standard deviation of 8.21%. Regarding the waist ratio (WHR), in the female gender, there was variation from 0.46 to 1.04, with a median of 0.85 and a standard deviation of 0.05 and in the male gender, it varied from 0.65 to 1.34, with a median of 0.86 and a standard deviation of 0.05. These values confirm the possibility of a risk for cardiovascular diseases, which presented a high risk for 458 (87.23%) girls and 9 (2.20%) boys.

Conclusions: We verified the efficiency of the anthropometric evaluation in the school space for the nutritional dynamics of children, based on high obesity rates and high abdominal fat estimation. These results evidenced the real need for multiprofessional intervention, aiming at the reduction of chronic noncommunicable diseases in adulthood.
TOWARD PATIENT-CENTERED MEDICINE: DEVELOPMENT AND FIELD TESTING OF A NOVEL CLINICAL REPORT COMMUNICATION SYSTEM FOR CARDIAC IMAGING PROCEDURES

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Background and objectives: A novel diagnostic imaging technique using cardiovascular magnetic resonance (CMR) was recently developed as a safe, fast, and comprehensive tool for assessing coronary vascular function. The imaging protocol involving simple breathing maneuvers and an oxygenation-sensitive sequence has the potential to become widely used in ambulatory patients. In the diagnostic workup of patients with suspected cardiovascular disease, the success of pharmacological and lifestyle interventions highly depends on the patients’ and their family physician’s collaboration. In this context, a common understanding of the patient’s vascular status is valuable. Therefore, building on promising clinical research, we aim to determine whether a concise report system with visual representation of the imaging results will improve the understanding and communication of patients and doctors.

Methods: Groups of patients, family physicians and cardiologists associated with the McGill University Health Center and the McGill University department of Family Medicine will separately be interviewed in semi-structured focus groups composed of five to six participants. All key informants will be invited to discuss how the proposed report system would affect their perceived understanding and/or compliance with interventions when compared to standard care.

Results: Following an inductive thematic analysis, semantic themes reflecting patterns of explicit content will be extracted from focus groups’ discussions. Results are anticipated to provide a realistic appraisal of patients’ and doctors’ impressions toward the new CMR communication system in primary care and clinical settings.

Conclusions: This study will contribute to advancements of innovative diagnostic imaging modalities in family medicine, cardiology and primary care. The implementation of efficient imaging practices and patients-centered communication systems may ultimately have a positive impact on patient safety, clinical decision-making, cost and outcomes.
Background and objectives: Diabetes Mellitus is associated with cardiovascular risk and the kidneys are severely affected by an intense intrarenal athero and arteriosclerosis resulting in diabetic nephropathy. Contrast-induced acute kidney injury (CI-AKI) is a toxic nephropathy that involves vasoconstriction and direct tubular toxicity with generation oxygen species (ROS). The decreased tissue oxygen in medula in preexisting renal dysfunction, as in Diabetes Mellitus (DM), can be a risk factor for CI-AKI. This study evaluated the effect of Heme Oxygenase-1 in the restoration of oxidant injury of CI-AKI in diabetic rats.

Methods: A total 24 adult male Wistar rats were randomized in 4 groups. Physiological parameters; renal function (creatinine clearance, crCl); oxidative injury (urinary peroxides, UP, tiobarbituric acid reactive substances−TBARS and thiols in renal tissue) and kidney histological analysis were evaluated. Rats were submitted to left uninephrectomy (Nx) on the 1st day. The DM was induced by a single dose of intravenous streptozotocin (65mg/kg i.v.) on the 20th day. The iodinated contrast (IC) meglumine ioxithalamate (6ml/kg) and hemin (HO 1 inducer; 10mg/kg; i.p.; 60 minutes before IC) were infused on the 85th day. Groups: Control (Nx+Citrate); Nx+DM; Nx+DM+IC; Nx+DM+IC+H.

Results: Diabetic groups showed polyphagia, polydipsia, polyuria, increase in the blood glucose and reduction in body weight (p<0.05). DM+IC group reduced the crCl (0.23±0.03 vs 0.51±0.08, p<0.05) and thiols in renal tissue (5.5±1.9 vs 12.4±4.6, p<0.05) with a proeminent increase in UP (45.4±10.2 vs 9.2±2.7, p<0.05) and TBARS (4.20±1.04 vs 0.26±0.07, p<0.05). These parametrs were significantly changed by hemin (crCl: 0.40±0.07 vs 0.23±0.03, thiols: 14.9±3.7 vs 5.5±1.9, UP: 26.1±13.1 vs 9.2±2.7, TBARS: 1.61±0.26 vs 0.26±0.07, p<0.05). Kidney histology showed tubular cells vacuolization and edema with moderate injury in DM+IC animals.

Conclusions: The data highlight the HO-1 renoprotective effect in oxidative damage in the CI-AKI associated with chronic disease, DM.
SYMPTOMS OF ANXIETY AND DEPRESSION IN INDIVIDUALS WITH TYPE 2 DIABETES: ASSOCIATIONS WITH CLINICAL DIABETES MEASURES AND SELF-MANAGEMENT OUTCOMES

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Background and objectives: Depression is strongly linked to poor outcomes in Type 2 diabetes, and is shown to influence both patient behaviour and underlying biological processes. Despite high rates of co-occurring depression and anxiety, few studies have adequately investigated the contributions of anxiety to diabetes-related outcomes. The objective of this study was to determine if specific affective symptoms (i.e., depression and anxiety) are differentially associated with clinical diabetes measures and self-management behaviours in individuals with Type 2 diabetes.

Methods: Using data from the Nord-Trøndelag Health Study (HUNT 3), we examined associations between affective symptoms and diabetes-related outcomes in 2,035 adults with Type 2 diabetes. Multivariate logistic regression was used to explore mutually exclusive associations between symptoms of depression and anxiety (both individual and concurrent) and the following outcomes: waist girth, HDL cholesterol, systolic blood pressure, triglycerides, c-reactive protein, non-fasting glucose, diet adherence, exercise, glucose monitoring, foot checks for ulcers, and the subjective experience of having diabetes. Analyses were also stratified by sex.

Results: After adjustment for confounders, depression was associated with a lower likelihood of avoiding fats (OR=0.20 [95% CI: 0.06, 0.68]) and a two-fold increased odds of feeling that diabetes is difficult. Anxiety was associated with decreased odds of high blood pressure (OR=0.71 [95% CI: 0.52, 0.97]), increased odds of eating vegetables (OR=1.66 [95% CI: 1.02, 2.73]), and an over two-fold increase in the feeling that having diabetes is difficult. In women, anxiety alone was associated with elevated c-reactive protein levels (OR=1.57 [95% CI: 1.05, 2.34]). In men, depressive symptoms were associated with elevated serum glucose (OR=3.20 [95% CI: 1.64, 6.20]) and hemoglobin A1c (HbA1c) levels (OR=5.00 [95% CI: 1.15, 8.23]).

Conclusions: Symptoms of depression and anxiety were differentially associated with key diabetes-related measures. Our results suggest the importance of specific symptomatology rather than overall symptom load in these outcomes, as well as sex-related differences with respect to two important clinical outcomes (i.e., anxiety and CRP in women and depression and glycemic control in men). These findings should alert practitioners to the importance of detection and management of specific psychological symptoms in Type 2 diabetes cases.
SESSION 4 - Diabetes
85-OXC1-172

MODULATION OF HUMAN ADIPOCYTE METABOLISM FOR THE PREVENTION OF TYPE 2 DIABETES

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Background and objectives: Experimental evidence in humans and animal models support that overexposure of lean tissue to fatty acids (FA) plays an important role in the development of type 2 diabetes (T2D). Adipose tissues play a central role in the regulation of FA fluxes. Limited FA storage in adipocytes has been associated with increased circulating levels of free FA occurring early in the development of T2D. More specifically, hypertrophic adipose tissue expansion, associated with multiple dyslipidemias, is a recognized contributor to T2D.

Methods: We used a systemic bioinformatics analysis of adipocyte metabolism to identify genes coding for enzymes affecting adipose tissue expansion mechanisms (adipocyte hypertrophy and/or hyperplasia).

Results: We performed in-silico gene deletion analysis on our adipocyte metabolic network, iTC1389adip, using flux balance analysis with and without carbon restriction. This analysis permitted the prediction of the effect of gene deletion on optimal production of lipid droplets and biomass as representation of adipose hypertrophy and hyperplasia respectively. 27 genes in the network were predicted as having a larger effect on lipid droplet with a small effect on biomass production (three in common between the two experiments, 13 without carbon restriction (Figure) and 11 with carbon restriction), which is an indication that these deletions could result in decreased adipocyte hypertrophy.

Conclusions: Some of the identified genes, such as LCAT and DGAT1, have experimental results supporting the predicted effect in adipocytes while others, such as FAR2 and HSD17B12, could serve as new potential targets in adipose tissue remodeling and diabetes treatment if their role is validated. These results will guide in-cellulo and ex-vivo studies to validate new therapeutic targets which could affect the development of T2D.
IMPACT OF A NUTRITIONAL INTERVENTION IN TYPE 1 DIABETIC PATIENTS WITH METABOLIC SYNDROME

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Background and objectives: Recent data has shown that up to 45% of patients with type 1 diabetes (T1D) have metabolic syndrome (MS), a comorbidity in rapid rise. The MS is a cluster of risk factors including abdominal obesity, hypertension, dyslipidemia and insulin resistance. It is an emergent problematic with few preventive or therapeutic interventions reported yet. A balanced low fat diet is recommended to improve the lipid profile and reduce cardiovascular risk for T1D patients. However, recent studies have demonstrated health benefits of a Mediterranean diet (MED) in the general population and in type 2 diabetic patients. The objective of this study is to compare 2 nutritional interventions (MED diet vs low fat diet) on waist circumference in T1D patient with MS.

Methods: Participants are randomised into 2 groups: 1) MED diet or 2) Low fat diet. The intervention includes 12 visits over 36 weeks with 9 nutritional education sessions. At inclusion, after 3 months and 6 months, anthropometric and biochemical measures are taken.

Results: To date, 24 participants are included (51,9±9,2 years, BMI:30,5±3,1 kg/m², Waist circumference:105,0±9,1 cm), and 7 have completed the study. Preliminary results show no significant difference in waist circumference reduction between both dietary interventions (-3,86cm low fat diet vs -2,33cm MED diet; p=0,542) or BMI (-1,08kg/m² low fat diet vs -0,73kg/m² MED diet; p=0,59) after 6 months.

Conclusions: These preliminary results demonstrate that a nutritional intervention on T1D patients with MS leads to a waist circumference and BMI reduction, with no significant difference between both diets. The planned complete sample size (n=28) will allow to determine if one of the diets brings more benefits on cardiometabolic profile. Moreover, the results could allow the comprehension of the advantages associated with a MED diet and might contribute to the development of nutritional strategies for those patients.
SESSION 4 - Diabetes
85-BYRF-232

HIGHER PREVALENCE OF GLUCOSE ABNORMALITIES DESPITE BETTER CLINICAL STATUS: COMPARISON BETWEEN CANADIAN AND FRENCH CYSTIC FIBROSIS COHORTS

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Background and objectives: For patients with cystic fibrosis (CF), association between early glucose abnormalities and worse clinical status (weight and pulmonary function) has been reported but could differ between CF populations. We compared clinical status and glycemic profile in two large CF standardized observational cohorts (Montreal, Canada and Rhône-Alpes region, France). All CF adult patients (≥ 18 years) without known CF-related diabetes (CFRD) of both cohorts attending the participating CF centers were included.

Methods: All patients underwent an OGTT with measures of fasting (G0), 1-h (G1) and 2-h (G2) glucose values. The same day clinical data was collected: pulmonary function by spirometry (%FEV1), body mass index (BMI), biochemical dosages and genotype. Data was analyzed with non-parametric Mann-Whitney tests between cohorts.

Results: 267 Canadian and 147 French CF patients were included. Sex ratio and proportion of F508del homozygous (most frequent mutation) are similar (p = 0.6 and p = 0.4, respectively). Canadian patients are older (mean age of 26.3 ± 7.9 vs 24.9 ± 6.7, p = 0.03). Age adjusted clinical status of Canadian group is better with higher %FEV1 (72.9 ± 21.8 vs 62.9 ± 22.2, p < 0.0001) and higher BMI (21.8 ± 3.0 vs 20.1 ± 2.2, p < 0.0001). The prevalence of de novo CFRD diagnosis (16.5 vs 10.0%, p = 0.01), as well as GO and G2 values were higher in the Canadian groups (respectively 5.5 ± 0.8 vs 4.8 ± 0.5mmol/L, p < 0.0001 for G0; 8.0 ± 3.3 vs 7.1 ± 2.7mmol/L, p < 0.004 for G2). For all glucose tolerance groups, Canadian patients displayed higher glucose area under the curve values compared to French patients even for patients with normal glucose tolerance (p =0.001).

Conclusions: Unexpectedly despite higher glucose values and incidence of de novo CFRD, Canadian CF patients have a better pulmonary function and BMI compared to the French CF patients. Potential underlying factors including insulin secretion and sensitivity, modifiers genes, nutritional behavior and clinical practices may play a role in these differences.
ASSOCIATION BETWEEN GLUCOSE INTOLERANCE AND BACTERIAL COLONISATION IN AN ADULT POPULATION WITH CYSTIC FIBROSION

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Background and objectives: Cystic fibrosis (CF) is a multisystemic disease that mainly affects the pulmonary and digestive systems. A particular mucus structure accumulates in the lungs and facilitates the bacterial colonisation of the respiratory tracts. In some patients, the bacterial colonisation expands overly and generates an acute deterioration of the usual symptoms of CF, also known as pulmonary exacerbations (PEx), leading to the most frequent cause of morbidity, mortality and respiratory failure. The improvement of life expectancy has led to the emergence of new comorbidities; the most common one is CF-related diabetes (CFRD). When blood glucose is ≥ 8 mmol/L, glucose is detected in the airway, creating a favourable environment for bacterial growth in the lungs of CF patients. We investigated the relationship between dysglycemia and lung pathogens in CF.

Methods: This is a cross-sectional observational and prospective analysis of adult CF patients, without known CFRD. All patients (N=260) underwent a 2 h-Oral Glucose Tolerance Test with glucose measurements each 30 min. Pulmonary bacterial colonisation of airway mucus, forced expiratory volume in 1 sec (FEV1), age, gender, nutritional status and the number of PEx requiring intra-venous antibiotics were collected at baseline and three years later for the follow-up. Statistical analysis using the Mann-Whitney U-Test and Chi2 non-parametric T-Test for normally distributed variables and Independent Sample T Test for normally distributed variables. A linear regression analysis was done to evaluate if OGTT levels changed overtime pre and post colonisation by comparing the slopes of both curves using GraphPad Prism.

Results: Stenotrophomonas maltophilia (S. maltophilia) was the sole bacteria increased in dysglycemic (AGT: 20.2%, CFRD: 21.6%) patients compared to normotolertants (NGT: 8.7%). S. maltophilia positive patients with dysglycemia had more pulmonary exacerbation events compared to NGTs (1.22 vs 0.63, P = 0.003). The interaction between S. maltophilia colonisation and glucose tolerance status significantly increases the risk of lower lung function (P=0.003). Its growth was not affected by the evolution of the glucose tolerance after three years follow-up.

Conclusions: Prevalence of S. maltophilia was higher in dysglycemic patients, supporting the idea that S. maltophilia is a marker of disease severity in CF.
PLASMA PALMITOYL-CARNITINE (C16:0) IS A MARKER OF INCREASED POSTPRANDIAL NONESTERIFIED FATTY ACID OXIDATION RATE IN PATIENTS WITH TYPE 2 DIABETES

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Background and objectives: Enhanced mitochondrial fatty acid utilization is known to increase radical oxygen species production and induce insulin resistance. An increased level of plasma acylcarnitine (AC) has been proposed to indicate mitochondrial energy substrate overload, a possible mechanism leading to insulin resistance in animal models. The aim of our study is to determine fasting and postprandial plasma acetyl-carnitine (C2:0), palmitoyl-carnitine (C16:0), oleoyl-carnitine (C18:1) and linoleoyl-carnitine (C18:2) levels and their relationship between plasma nonesterified fatty acid (NEFA) appearance and oxidation rates and insulin sensitivity in subjects with type 2 diabetes (T2D, n = 12) and non-diabetic offspring of two parents with T2D (pre-diabetes, FH+, n = 11) compared to healthy subjects without family history of T2D (FH-, n = 12).

Methods: All subjects underwent three metabolic protocols: (A) a euglycemic hyperinsulinemic clamp at fasting; (B) a 6-hour steady-state oral standard liquid meal; and (C) an identical 6-hour steady-state meal intake study with a euglycemic hyperinsulinemic clamp. Acylcarnitine levels were measured by liquid chromatography with tandem mass spectrometry and fatty acid oxidation rates were measured by stable isotopic tracer techniques with indirect respiratory calorimetry.

Results: At fasting and during the insulin clamp, C16:0 was significantly higher in the T2D group vs. FH+ (P < 0.05). In the postprandial state, C2:0, C16:0 and C18:1 decreased significantly but this reduction was blunted in T2D even during normalization of postprandial glucose levels during the insulin clamp. However, postprandial C18:2 levels remained unchanged with or without insulin clamp in the 3 groups of participants. Fasting C16:0 correlated with fatty acid oxidation (FAO) (r=+0.604; p=0.0002), triacylglycerol (TG) (r=+0.427; p<0.02) and waist circumference (r=+0.416; p=0.02).

Conclusions: Spillover of AC occurs in T2D, but not in FH+. C16:0 can be a useful biomarker of excessive FAO.
SESSION 5 - Epidemiology - Genetics
85-8KXD-152

MASKED HYPERTENSION AND EFFORT-REWARD IMBALANCE AMONG 2369 WHITE-COLLAR WORKERS

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Background and objectives: Cardiovascular diseases (CVD) are the main cause of death worldwide. Hypertension is the leading CVD risk factor. The diagnosis of hypertension traditionally relies on clinic blood pressure (CBP), but the use of ambulatory blood pressure measurement (ABPM) has refined hypertension classification. The refined classification includes ‘masked hypertension’, a clinical condition in which CBP level is normal but ABPM are in the hypertensive range. Studies have reported that associations between masked hypertension and CVD are as strong as those found for sustained hypertension (i.e. hypertension diagnosed with both CBP and ABPM). Evidences have accumulated on the key role of adverse psychosocial work factors on blood pressure (BP), but little is known on the effect of these factors on masked hypertension. The objective of the present study was to determine whether adverse psychosocial work factors from the effort-reward imbalance (ERI) model are associated with the prevalence of masked hypertension in a population of white-collar workers.

Methods: White-collar workers were recruited from three public organizations. BP was measured at the workplace for CBP (mean of the first three readings taken by a trained assistant) followed by ambulatory measurements (mean of all subsequent readings taken during the working day). Masked hypertension was defined as CBP <140/90 mmHg and ambulatory BP ≥ 135/85 mmHg. ERI exposure at work was measured using Siegrist's validated questionnaire.

Results: Blood pressure readings were obtained from 2,369 workers (participation proportion: 85%). ERI exposure (OR: 1.53 (95% CI: 1.16-2.02) and high efforts at work (OR: 1.61 (95% CI: 1.13-1.29) were associated with masked hypertension, after adjusting for sociodemographic and cardiovascular risk factors.

Conclusions: Workers exposed to an imbalance between effort spent at work and reward had a higher prevalence of masked hypertension. High efforts at work might be of particular importance in explaining this association. Future studies should be designed to investigate how clinicians can include questions on psychosocial work factors to screen for masked hypertension and how workplace interventions can decrease adverse psychosocial exposures to lower BP.
EFFORT-REWARD IMBALANCE AT WORK AND THE PREVALENCE OF UNSUCCESSFULLY TREATED HYPERTENSION AMONG WHITE-COLLAR WORKERS

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Background and objectives: We examined the association between effort-reward imbalance (ERI) exposure at work and unsuccessfully treated hypertension among white-collar workers from a large cohort in Canada.

Methods: The study relies on a repeated cross sectional design involving three waves of data collection over a 5-year period. The study sample was composed of 474 workers treated for hypertension, accounting for 739 observations. At each time, ERI was measured using validated scales and ambulatory BP (ABP) was measured every 15 minutes during the working day. Unsuccessfully treated hypertension was defined as daytime ABP greater than or equal to 135/85 mmHg. Adjusted prevalence ratios and 95% confidence intervals (CI) were estimated using generalized estimating equations.

Results: Participants in the highest tertile of ERI exposure had a higher prevalence of unsuccessfully treated hypertension (prevalence ratio: 1.42, 95% confidence interval: 1.14-1.76) after adjustment for gender, age, education, family history of CVD, BMI, diabetes, smoking, sedentary behaviors and alcohol intake.

Conclusions: The results support the deleterious effect of adverse psychosocial work factors from the ERI model on blood pressure control in treated workers. Reducing these frequent exposures at work might lead to substantial benefits on BP control at the population-level.
EFFECTIVENESS OF A WORKPLACE INTERVENTION TARGETING ADVERSE PSYCHOSOCIAL WORK FACTORS ON BLOOD PRESSURE AND HYPERTENSION

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Background and objectives: A number of large scale prospective studies have documented the deleterious effects of adverse psychosocial work factors on high blood pressure (BP) and cardiovascular disease (CVD). However, little is known on the effect of workplace interventions targeting adverse psychosocial work factors on BP and hypertension. The present study assess the effectiveness of a workplace intervention targeting adverse psychosocial work factors in lowering ambulatory BP (ABP) and hypertension prevalence.

Methods: This study used a quasi-experimental pre-post design with an intervention group (N=1,093) and a control group (N=1,074). Pre-intervention and post-intervention measurements were collected between 2000 and 2007 in Quebec City, Canada. The study population was composed of all white-collar workers employed in three public organizations. The intervention was designed to reduce adverse psychosocial work factors by implementing organizational changes. These changes were made by the managers and monitored by the researchers. ABP was measured at baseline and then at six and 36 months after the intervention. The evolution of ABP means and hypertension prevalence was examined.

Results: ABP means and hypertension prevalence significantly decreased in the intervention group while no change was observed in the control group. The differential decrease in systolic BP between the intervention and the control group was 2.0 mmHg (95% CI: -3.0, -1.1). The prevalence ratio comparing change in hypertension prevalence in the intervention and control groups was 0.80 (95% CI: 0.67-0.94).

Conclusions: At the population level, systolic BP reductions in the range of 2 mmHg, such as those observed in the present study, could prevent a significant number of premature deaths and disabling strokes. These findings suggest that adverse psychosocial work factors are relevant targets for the primary prevention of hypertension.
COMBINED EFFECT OF JOB STRAIN AND PSYCHOLOGICAL DISTRESS ON THE RISK OF RECURRENT MYOCARDIAL INFARCTION

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Background and objectives: Cardiovascular diseases (CVD) are the leading cause of death worldwide. As much as 42% of CVD deaths are attributable to coronary heart disease, most of which are due to myocardial infarction. After an initial myocardial infarction (MI), an important proportion of men and women returning to work experience psychological distress and job strain. Psychological distress and job strain can co-occur and are increasingly recognized as modifiable risk factors of coronary heart disease. Previous studies mainly used one-point measurements to evaluate these exposures. Also, little is known about the combined effect of psychological distress and job strain on recurrent MI. The current study evaluates the combined effect of job strain and psychological distress on the risk of recurrent MI among workers returning to work after initial MI.

Methods: A prospective cohort study was conducted among 972 men and women who returned to work after a first acute MI. Workers were recruited in 30 hospitals in the province of Quebec. The mean follow-up duration was 5.9 years. Psychological distress and job strain were measured using validated instruments (Psychiatric Symptom Index (PSI) and Job Content Questionnaire respectively) at baseline and at 2.2 years of follow-up. The outcome was a recurrent MI (fatal or non-fatal MI or unstable angina). Information on the incidence of recurrent MI from baseline to the end of follow-up (1998-2005) was collected from medical records. Adjusted hazard ratios (HR) of recurrent MI were obtained with the Cox regression after adjustment for confounders.

Results: Workers with having both high job strain and high psychological distress had 2.7 times higher risk of recurrent MI (HR: 2.68; 1.02- 7.03) compared to unexposed ones. Single exposures to chronic job strain and chronic psychological distress were independently associated with an increased risk of recurrent MI: HR 3.05; (1.63- 5.72) and HR 1.64; (1.01- 2.68), respectively. No additive interaction was found.

Conclusions: Workers having chronic high job strain or chronic high psychological distress after an initial MI had an increased risk of recurrent MI. There was no indication of additional risk in patients having combined exposures. Secondary prevention efforts to reduce CVD recurrence should include measures aimed at improving the psychosocial work environment and workers’ mental health.
EFFECTS OF WORK-RELATED PSYCHOSOCIAL FACTORS ON POST-RETIREMENT BLOOD PRESSURE AND ARTERIAL STIFFNESS: A 22-YEAR PROSPECTIVE STUDY PROTOCOL

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Background and objectives: Increased blood pressure and arterial stiffness are two major risk factors for cardiovascular disease. There is evidence that work-related psychosocial factors have deleterious effects on blood pressure and evidence is scarce for arterial stiffness. In addition, it is not known whether these effects persist or not after retirement. The objective of the study is to measure prospectively the effects of exposure to work-related psychosocial factors during active life on post-retirement blood pressure and arterial stiffness.

Methods: This is a prospective cohort study of 22 years, with three measurement times. The first two times (1991-93 (T0), 1999-2001 (T1)) are completed. The third time (T2) began in June 2015 and will continue until December 2017. The baseline population included 9,189 white collar employees from 19 public organisations in Quebec City. This project targets participants with retirement status at time T2. Work stressors such as high job strain and effort-reward imbalance were measured using validated questionnaires. Blood pressure (T0, T1 and T2) and arterial stiffness expressed as the carotid-femoral pulse wave velocity (T2) are measured using validated instruments. The effects of work stressors on blood pressure and arterial stiffness will be estimated by multilevel linear regression models adjusting for the main confounding factors.

Results: 3523 participants (47.5% women) aged on average 66.3±6.3 years were seen from June 2015 to December 2016. At baseline, the mean systolic / diastolic blood pressure was 117.7±14.4 / 75.1±10.2 mm Hg. The proportion of subjects exposed was 20.4% for high job strain and 25.2% for effort-reward imbalance. This is the first study to measure the effects of high job strain and high effort-reward imbalance present during active life on post-retirement blood pressure and arterial stiffness. This project will contribute to knowledge on the psychosocial etiology of long-term variations in blood pressure and arterial stiffness.

Conclusions: If deleterious effects are detected, the results will support programs to promote cardiovascular health by improving the psychosocial environment at work. In addition, this study will contribute to a better understanding of the consequences of psychosocial exposures at work on cardiovascular health.
A NOVEL LOCUS ASSOCIATED TO DELTA-6 DESATURASE ACTIVITY ALTERS PLASMA TRIGLYCERIDE LEVELS

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Background and objectives: Previous studies have revealed that single nucleotide polymorphisms (SNPs) located within the FADS1-FADS2 gene cluster in chromosome 11, which encodes delta-5 (D5D) and delta-6 (D6D) desaturases, may alter desaturation rates of both enzymes, as well as the associated endogenous levels of polyunsaturated fatty acids (PUFA). As well, PUFA levels have been previously associated to alterations in plasma triglycerides (TG). The aim of this study was to reveal novel loci associated to desaturase activities on a genome-wide scale and to analyze their impact on plasma TG levels.

Methods: We conducted a genome-wide association study of D5D and D6D activities in a cohort of 141 individuals from the Fatty Acid Sensor (FAS) study using the Illumina HumanOmni5-QuadBeadChip. Estimates of D5D and D6D activities were computed using product-to-precursor PUFA ratios as follows: arachidonic acid (AA)/dihomo-gamma-linolenic acid (DGLA) for D5D, and DGLA/linoleic acid (LA) for D6D. PUFA levels were measured by gas chromatography in plasma phospholipids. D5D- and D6D-associated SNPs were tested for further associations with PUFA and plasma TG levels using the analysis of variance with age, sex and body mass index included in the model as covariates.

Results: We identified 24 previously reported SNPs associated with PUFA levels and desaturase activities as significantly associated with D5D activity within the FADS1-FADS2 gene cluster. Furthermore, we identified five novel loci associated with D5D activity at genome-wide significance level (P<1.87×10⁻⁸): an intronic variation at chromosome 4 (LINC01378), an upstream variation at chromosome 19 (UBXN8) and 6 intergenic variations at chromosomes 1, 6 and 8. A novel SNP associated with D6D activity and mapped to the ARHGEF10 locus (rs2280885/A>G; chr8:1830025/GRCh37/hg19) was identified, with carriers of the rare allele showing a significant increase in D6D activity and plasma TG levels.

Conclusions: These results confirm the relevance of the genetic variation within the FADS1-FADS2 gene cluster in D5D desaturation rates and reveal five novel loci associated with D5D activity. A novel polymorphism strongly associated with higher D6D activity and increased plasma TG levels was identified within the ARHGEF10 locus, pointing to this gene as potentially involved in altered PUFA profile and dyslipidemia.
NEW GENETIC DETERMINANTS OF THE PLASMA TRIGLYCERIDE RESPONSE TO AN OMEGA-3 FATTY ACID SUPPLEMENTATION

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Background and objectives: It is documented that individuals respond differently to an omega-3 (n-3) fatty acid (FA) supplementation regarding triglyceride (TG) levels. This heterogeneity in the TG response is partially attributable to genetic variations. A genome-wide association study (GWAS) conducted by our group on participants of the Fatty Acid Sensor study identified 13 loci in six genes (IQCJ, NXPH1, PHF17, MYB, NELL1 and SLIT2) associated with the TG response to an n-3 FA supplementation. We recently conducted genotyping in IQCJ, NXPH1, PHF17 and MYB genes, and found gene-diet interactions for several single-nucleotide polymorphisms (SNPs) modulating plasma TG levels. The objective was to test whether remaining genes (NELL1 and SLIT2) are also associated with TG levels following an n-3 FA supplementation.

Methods: 208 subjects were given n-3 FA supplements during six weeks, for a total of 3g/d of n-3 FA (1.9-2.2g of EPA and 1.1g of DHA). TG levels were measured before and after the intervention. Genotypes for NELL1 and SLIT2 gene regions were obtained for 141 subjects (Illumina Infinium Omni5 BeadChip) and further genotypes were imputed using 1000 Genomes project data as a reference set (release 1000G Phase I v3, updated 26 Aug 2012). Markers were inferred using algorithms implemented in IMPUTE2. Allele frequency between responders (reduction in TG levels of >0mM) and non-responders (increase in TG levels of ≥0mM) was compared using PLINK. The top ten SNPs in NELL1 and SLIT2 were kept for statistical analyses according to p values.

Results: Stepwise regressions were conducted for both genes independently and revealed one SNP in NELL1 (rs11025748) and one in SLIT2 (rs10028772) that were driving associations with TG levels, respectively contributing to 11.46% and 8.00% of the variance of the plasma TG trait. Differences in genotype frequency distribution between responders and non-responders were observed for all studied SNPs in NELL1 and SLIT2. Briefly for SNPs in NELL1, rare genotypes were more frequent among non-responders than responders.

Conclusions: Increasing the density of markers in GWAS-associated loci revealed novel SNPs in NELL1 and SLIT2 associated with the plasma TG response to an n-3 FA supplementation.
POLYGENIC CONTRIBUTION TO CORONARY ARTERY DISEASE IN PATIENTS MANIFESTING WITH EARLY CARDIOVASCULAR EVENTS

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\textbf{Background and objectives:} Recent genome-wide association studies (GWAS) have identified common variants associated with coronary artery disease (CAD). Carrying a high number of risk variants could contribute to premature manifestation of CAD. This study aimed to determine, in participants with early-onset CAD (EOCAD), the polygenic contribution attributable to an accumulation of common risk variants.

\textbf{Methods:} In 111,418 British participants from the UK Biobank cohort including 96 with EOCAD (under the age of 40 for men and 45 for women) who underwent a revascularization procedure, we calculated a genetic risk score (GRS) from 182 independent variants associated with CAD in a recent GWAS meta-analysis (GRS\textsubscript{182}). We then performed genome-wide genotyping with imputation in 30 individuals of European ancestry recruited locally with angiography proven EOCAD without a secondary cause and compared GRS\textsubscript{182} with the control group from the UK Biobank cohort.

\textbf{Results:} Participants with EOCAD in the UK Biobank cohort had a significantly higher GRS\textsubscript{182} than controls ($P=3.21\times10^{-9}$). An increase of 1 standard deviation in GRS\textsubscript{182} corresponded to an OR of 1.84 (1.52 - 2.24) for EOCAD. GRS\textsubscript{182} was significantly increased in the local cohort compared to UK Biobank controls ($P=0.001$). Seven participants from the local cohort had a GRS\textsubscript{182} corresponding to an estimated two-fold increase in EOCAD risk, including one with an odds ratio estimated at 6.10 (3.43 - 10.81). This woman suffered from a STEMI at age 44 and had multivessel disease at angiography; traditional risk factors included smoking and hypertension.

\textbf{Conclusions:} These results suggest a significant polygenic contribution in individuals presenting with early-onset CAD. Determination of the polygenic risk component could be included in the diagnostic workup of patients with EOCAD.
PERCEIVED NEIGHBOURHOOD SAFETY AND SYSTOLIC BLOOD PRESSURE IN CHILDREN

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Background and objectives: Residing in neighbourhoods perceived to be unsafe appears to increase the risk of hypertension in adults; moreover stress is a likely mechanism. We examined these relations in children from QUALITY, a longitudinal cohort study investigating the natural history of pediatric obesity. Specifically, we tested whether perceived neighbourhood safety predicted systolic blood pressure (SBP), and whether stress biomarkers were implicated.

Methods: Baseline data were collected in 2005-2008 when children were aged 8-10 years (n=630); follow up data were collected two years later when children were aged 8-10 years (89% response). SBP was measured at both time points and an average of 3 in-clinic readings (from a total of 5 measurements) were obtained using oscillometry; age-, sex-, and height-specific percentiles of SBP were computed. A stress biomarker was generated, based on 5 salivary cortisol samples from which maximum slope was estimated. Perception of neighbourhood safety was reported at baseline by parents using a 5 point Likert scale (dichotomized as safe/unsafe). General linear modelling was used to test the relation of neighbourhood safety with (Model 1) predicted SBP and (Model 2) change in SBP. Both models adjusted for age, sex, BMI, puberty, parent education, area-level education, social and material deprivation, and disorder. We tested models with and without the stress biomarker. Analyses were restricted to 430 children with complete data.

Results: In model 1, neighbourhood safety was associated with a 5.8 percentile increase in SBP (B=5.79, 95% C.I.:1.44–10.14) two years later. In model 2, i.e. including baseline SBP, the relation was attenuated but results suggested that neighbourhood safety was associated with change in SBP (B=3.51, 95% C.I.: -0.67-7.69). The stress biomarker was not associated with neighbourhood safety or with SBP. be included in the diagnostic workup of patients with EOCAD.

Conclusion: Elevated blood pressure in childhood is detrimental to health; while interventions improving neighbourhood safety may be beneficial to cardiometabolic risk factor profiles, underlying mechanisms remain to be elucidated.
INTERLEUKIN-6 IS POSITIVELY ASSOCIATED WITH AORTIC STIFFNESS AND MORTALITY IN END-STAGE RENAL DISEASE PATIENTS

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Background and objectives: Cardiovascular disease (CVD) is the leading cause of mortality in patients with chronic kidney disease (CKD). Studies have shown an association between aortic stiffness, a non-traditional risk factor, and high rate of mortality in CKD patients. Using a CKD animal model with vascular calcification, we reported that interleukin-6 (IL-6) may be involved in the process of vascular calcification. Therefore, the aims of the study were 1) to investigate the association between IL-6 and aortic stiffness and 2) to evaluate the impact of IL-6 on all-causes and cardiovascular mortality in CKD patients.

Methods: In this observational study, we enrolled 351 CKD patients on dialysis (226 on hemodialysis, 56 peritoneal dialysis and 69 before transplantation). Aortic stiffness and its hemodynamic complications were determined non-invasively by the assessment of carotid-femoral pulse wave velocity (cf-PWV), augmentation index (Aix) and central pulse pressure (PP). Interleukin-6 levels were measured in plasma by ELISA. Survival analysis was performed on 282 HD and DP patients using Kaplan-Meier and Cox regression after a median follow-up of 38 months.

Results: Interleukin-6 was positively associated with aortic stiffness adjusted for mean blood pressure determined by cf-PWV (Standardized β=0.270; P<0.001), Aix (Standardized β =0.224; P<0.001) and central PP (Standardized β=0.147; P=0.003). In a multivariate linear regression model adjusted for age, diabetes, hypertension, CVD, smoking and mean blood pressure, IL-6 was still positively associated with cf-PWV (Standardizedβ=0.090; P=0.037). During follow-up, 192 deaths occurred. Patients with higher levels of IL-6 had an increased all-causes mortality risk (HR:1.7; 95%CI:1.3–2.3; P=0.001) and cardiovascular mortality risk (HR=2.5; 95%CI:1.7–3.8,P<0.001). Adjustment for clinical cofounders (age, CVD, hypertension, Diabetes, smoking) did not change the relationships (HR(all-causes)=1.43; 95%CI:1.06-1.92; P=0.019 and HR(cardiovascular)=1.92; 95%CI:1.26-2.93; P=0.003). The impact of IL-6 on mortality decreased when adding cf-PWV (HR(all-causes)=1.36; 95% CI:1.03-1.83; P=0.047 and HR(cardiovascular)=1.22; 95%CI:1.19-2.80; P=0.006) in the previous model suggesting that the detrimental role of IL-6 on mortality may involve aortic stiffness.

Conclusions: This study reveals a positive relationship between IL-6, aortic stiffness and mortality in CKD patients. Our results, together with our previous findings in an experimental animal model, indicated that IL-6 may represents a novel therapeutic target of CKD-related-CVD.
IMPACT OF KIDNEY TRANSPLANTATION ON AORTIC PULSE WAVE VELOCITY AND AORTIC STIFFNESS INDEX β0

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Background and objectives: Patients with chronic kidney disease are at increased risk of aortic stiffness and cardiovascular disease. We have previously shown that aortic pulse wave velocity (PWV) improves as early as 3 months post-kidney transplantation (KTx). Arterial stiffness index β₀ has been proposed to be an intrinsic blood pressure independent parameter of vascular wall property. The aim of this study is to examine 1) the early versus late changes in aortic PWV and stiffness index β₀ and 2) to define the characteristics of patients with favorable and unfavorable trajectories of stiffness index β₀.

Methods: In this observational longitudinal study, 79 patients who underwent KTx were enrolled and followed-up before, 3, 6 and 24 months after KTx. Aortic stiffness was determined non-invasively by the assessment of carotid-femoral pulse wave velocity (cf-PWV) (Complior) while central mean blood pressure was obtained from tonometry applanation (SphygmoCor). Cytokines profile was measured in plasma by ELISA using a Multiplex array.

Results: There was an early reduction of β₀ 3 months after KTx, (from 29 ± 18 to 26 ± 11 (P=0.014)). After this initial decrease in stiffness in β₀, there was a gradual increase at 6 and 24 months (from 26±11 to 28±11). The faster progression of β₀ after an initial improvement was not related to renal function, age, comorbidities or kidney donor characteristics. Nonetheless, the accelerated progression of β₀ was associated with higher levels of pro-inflammatory cytokines, such as interleukin-6 (P=0.029), interleukine-8 (P=0.040) and interleukin-10 (P=0.032).

Conclusion: The early improvement of aortic stiffness index β₀ after KTx suggests that KTx leads to an early improvement of the intrinsic mechanical properties of aorta. However, this improvement is followed by a later progression of β₀, which is associated with increased pro-inflammatory cytokines, suggesting that activation if immune system may be involved in arterial wall remodelling in kidney transplant recipients.
AORTIC RESERVOIR FUNCTION, REGIONAL ARTERIAL STIFFNESS AND AORTIC-TO-BRACHIAL STIFFNESS GRADIENT IN DIALYSIS POPULATION

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Background and objectives: A decrease in reservoir function of the aorta is associated with increased cardiovascular events. Vascular aging (stiffness) is accelerated in patients with chronic kidney disease in need of dialysis, where diabetes and hypertension are over-represented. In a dialysis population, we previously observed an annual reduction in brachial stiffness which was partly explained by a greater stiffness of the aorta. This contrast in progression of arterial stiffness between central and peripheral large arteries leads to a greater inversion of the aortic-to-brachial stiffness gradient. The aim of this study was to determine the relationship between aortic reservoir pressure, regional arterial stiffness and aortic-to-brachial stiffness gradient.

Methods: Among 310 patients with chronic kidney disease on dialysis, aortic and brachial stiffness were measured by determination of pulse wave velocity of carotid-femoral (cf-PWV) and carotid-radial (cr-PWV) segments (Complior). The aortic-to-brachial stiffness gradient was calculated by the ratio of cf-PWV to cr-PWV (PWV ratio). Central reservoir pressure (RP), its integral (AUC-RP) and excess pressure parameters (XSP, AUC-XSP) were derived from radial pressure waveforms (Sphygmocor).

Results: Reservoir pressure parameters were significantly associated with cf-PWV (stdz β of RP=0.194, stdz β of AUC-RP=0.168) and PWV ratio (stdz β of RP=0.283, stdz β of AUC-RP=0.310) in multivariate models taking into account mean arterial pressure, age, sex, hemodialysis status, diabetes, height and heart rate, all with p<0.001. An inverse association was observed in multivariate models between reservoir pressure and cr-PWV (stdz β of RP= -0.153 with p<0.035, stdz β of AUC-RP= -0.221 with p<0.001). In contrast, excess pressure parameters were not significantly associated with regional stiffness and PWV ratio in multivariable models.

Conclusions: In a dialysis population, aortic reservoir function was associated with aortic stiffness and PWV ratio and negatively associated with brachial stiffness in multivariate models. In contrast, no association was observed between excess pressure parameters and PWV after adjustments for potential confounders.
CHANGES IN ARTERIAL STIFFNESS GRADIENT INDUCED BY NITROGLYCERIN: CENTRAL HEMODYNAMIC IMPACT

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Background and objectives: Cardiovascular disease is the leading cause of death in chronic kidney disease, where hypertension and diabetes are over-represented. In end-stage renal disease patients treated with dialysis, we have shown that aortic-brachial stiffness gradient (PWV ratio) outperforms aortic stiffness, measured by carotid-femoral pulse wave velocity (cf-PWV), for the prediction of mortality. As vasodilator agents mainly affect large muscular arteries, we hypothesized that nitroglycerin administration (NTG) will increase arterial stiffness gradient. The aim was to examine the impact of NTG on reflected waves through changes in arterial stiffness gradient, using PWV ratio.

Methods: This study was conducted in 35 non-dialysis patients. Mean age was 66±10, 77% were men, 17% and 14% of the subjects had diabetes and cardiovascular disease. Aortic and brachial stiffness were respectively measured by determination of cf-PWV and carotid-radial pulse wave velocity (cr-PWV) at baseline and 5 minutes post-NTG 0.4 mg s.l. PWV ratio was obtained dividing cf-PWV by cr-PWV. Applanation tonometry on radial artery was used to derive central arterial pressure. Generalized estimating equations were used to evaluate the associations between changes in PWV ratio induced by NTG and reflected pressure wave after adjustments for mean arterial pressure (MAP) and heart rate.

Results: At baseline, cf-PWV and cr-PWV were respectively 12.0±2.3 m/s and 9.4±1.4 m/s, resulting in a PWV ratio of 1.30±0.30. After NTG, MAP (88 ± 11 mmHg, p=0.108) and cf-PWV (12.1 ± 2.6 m/s, p=0.290) were unchanged. However, there was a significant reduction in cr-PWV by 0.67 m/s (p<0.001), which resulted in a significant increase in PWV ratio by 0.12 (p=0.001). PWV ratio was significantly associated with the decrease in amplitude of reflected waves (β [95%CI] = -14.9 mmHg [-20.6 - -9.2], p<0.001) in univariate analysis and after adjustments for MAP and heart rate (β [95%CI] = -7.4 mmHg [-12.7 - -2.1], p=0.006).

Conclusions: The present study shows that NTG adversely affected aortic-brachial stiffness gradient which was a significant determinant of the decrease in reflected pressure waves. Despite the appearance of an advantageous condition for central pressure, future studies will be needed to describe the impact of changes in arterial stiffness gradient on the periphery.
THE EFFECTS OF OMEGA-3 ON BLOOD PRESSURE AND THE RELATIONSHIP BETWEEN SERUM VISFATIN LEVEL AND BLOOD PRESSURE IN PATIENTS WITH TYPE II DIABETES

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Background and objectives: Hypertension is a condition normally detected in people with type II diabetes. It eventually leads to cardiovascular diseases in the patient. Visfatin is an adipocytokine which is secreted from adipose tissue and can affect the inflammatory reaction and also serum lipid levels. Additionally, omega-3 inhibits the accumulation of fat and formation of insulin resistance. The current study tried to investigate the effects of omega-3 on blood pressure compared to placebo and the relationship between serum visfatin levels and blood pressure.

Methods: A total number of 71 women with type II diabetes were randomly assigned to 2 groups to receive either omega-3 capsules or placebo capsules. In the first step, a questionnaire consisting age, height, weight, waist and hip circumferences, and systolic and diastolic blood pressure was filled out for each subject. Blood samples were then collected for laboratory tests. The next step was to conduct 8 weeks of intervention. All variables, except age, were measured again after the intervention. Hip circumference was considered as the maximum circumference of the buttocks. Waist circumference was measured by placing a tape horizontally across the abdomen at the end of a normal exhalation. Laboratory tests included the assessment of visfatin, glucose, and glycated hemoglobin (HbA1c) concentrations. Lipid profile, i.e. low density lipoprotein (LDL), high density lipoprotein (HDL), triglyceride (TG), and cholesterol, was also assessed. Using SPSS18, data obtained from the study was analyzed by a variety of appropriate statistical tests.

Results: There was a significant change in mean differences of systolic and diastolic blood pressure. Blood pressure showed a significant reduction in the omega-3 group compared to the placebo group. However, no significant changes were observed in systolic and diastolic blood pressure before and after the intervention (P > 0.05).

Conclusion: Based on the results of this study, a daily consumption of omega-3 is suggested for patients with type II diabetes.
SESSION 6 - Hypertension - Interventional Cardiology  
85-F38H-92

EFFICACY AND SAFETY OF SINGLE VS COMBINATION DEVICE USE IN ENDOVASCULAR APPROACH TO TREAT COMMON FEMORAL ARTERY (CFA) LESIONS

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Background and objectives: Endovascular approach to treat CFA lesions is becoming more common. Though endovascular devices are used alone or in combination, there is no data to compare efficacy and safety with use of single device or combination of devices.

Methods: It is an observational cohort study and we followed patients for one-year who underwent endovascular interventions to CFA lesions alone or with other lesions/vessels with single device atherectomy or balloon angioplasty or combination of both.

Results: There were 61 CFA interventions performed with single device (15) or combination of devices (48). Average age was 70, 33 males with risk factors i.e. diabetes mellitus (28), hypertension (61), dyslipidemia (60), CAD (36), MI (16), CKDIII/IV (25), CHF (17), revascularization (27) and CVA (20). Sheath sizes were 6F(6), 7F (49) and 8F(6). Distal Embolic protection devices were used in 30 patients. Freedom from target lesion revascularization (TLR) 61% with single device and 81% in combined device use group. In single device group, 30% patients had adverse events (3 late distal vessel thrombus) and 1 secondary lesion dissection per-operatively and in combination group 14% had adverse events; 8% developed secondary lesion dissection, 2% retained DEP device, 2% distal embolization after retrieval of embolic protection device and 2% had distal vessel occlusion later on. Advanced age, total number of intervention to different lesions, proximal vessel revascularization and tissue loss were associated with repeat revascularization procedure and vessel dissection was noted with distal vessel intervention or CTO revascularization. Plaque excision devices were implicated more with dissection.

Conclusions: Combination device use by endovascular approach to treat CFA lesions has better clinical outcomes at one-year when compared to single device use. One-year patency is inferior, but length of stay and local wound infection rate are lower when compared with classic end arterectomy. Long-term follow up is needed to assess intermediate and long term efficacy of these devices by endovascular approach.
DISTURBED CHOLESTEROL HOMEOSTASIS IN PROSTAGLANDIN E RECEPTOR 4 KNOCKOUT MICE MODEL

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Background and objectives: The liver plays a central role in maintaining cholesterol homeostasis by balancing multiple pathways including de novo cholesterol, dietary cholesterol uptake, reverse cholesterol transport, bile acid synthesis and biliary cholesterol excretion. The goal of this study was to investigate whether or not genetic ablation of prostaglandin E receptor subtype 4 (EP4) affects hepatic cholesterol homeostasis.

Methods: EP4\textsuperscript{+/+} and EP4\textsuperscript{-/-} mice (15-17 weeks old) received either saline or EP4 agonist (CAY10580, 200µg/kg body weight/day, \textit{i.p.}) for three weeks. The effects of EP4 deficiency and EP4 stimulation on the biosynthesis, uptake, excretion and elimination of cholesterol were studied.

Results: Mice lacking EP4 developed spontaneous hypercholesterolemia. EP4\textsuperscript{-/-} mice showed a 48% increase in total cholesterol, 84% increase in very low density lipoprotein/low density lipoprotein (VLDL/LDL)-cholesterol and 15.6% increase in high density lipoprotein (HDL)-cholesterol as compared to wild type littermates. siRNA knockdown of EP4 in HepG2 cells enhanced cholesterol efflux and decreased the ability of these cells to uptake cholesterol. Mice receiving the selective EP4 agonist CAY10580 decreased high-fat diet feeding (HFD)-induced hypercholesterolemia (by 28.5%), reduced liver tissue weight (by 28%) and slowed weight gain (by 25.3%). The increase in plasma cholesterol caused by EP4 deficiency was attributable to the combinatorial effects of impaired conversion of cholesterol into bile acids for elimination and enhanced release of cholesterol from the liver, but was independent of changes in hepatic cholesterol biosynthesis and cholesterol uptake by the liver.

Conclusions: In summary, mice lacking EP4 result in spontaneous hypercholesterolemia and treatment with EP4 agonist dampens cholesterol levels in mice. These findings indicate that EP4 plays an important part in hepatic cholesterol homeostasis. Therefore, stimulation of EP4 appears to be a potentially novel strategy for lowering plasma cholesterol and slowing weight gain.
VARIABILITY IN THE SERUM TRIGLYCERIDE RESPONSE TO SUPPLEMENTATION WITH EICOSAPENTAENOIC AND DOCOSAHEXAENOIC ACID AMONG MEN AND WOMEN AT CARDIOVASCULAR RISK

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Background and objectives: Recent studies suggest that eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids may have distinct effects on cardiovascular risk. The objective of this study was to compare the serum triglyceride (TG) response after EPA and DHA supplementation (re-esterified triacylglycerol, 90% pure) in men and women at risk for cardiovascular disease.

Methods: In a double-blind, controlled, crossover study, 48 men and 106 women with abdominal obesity and low-grade systemic inflammation but otherwise healthy were randomized to three treatment phases: 1- EPA (2.7g/d), 2- DHA (2.7g/d), 3- control (corn oil, 0g/d of EPA+DHA). All supplements were provided as 1g capsules for a total of 3g/d. The 10-week treatments were separated by a median 9-week washout. Changes in serum TG and variability of the response were analyzed as a function of treatments.

Results: The reduction vs. control in serum TG concentrations was greater with DHA (-18.3±2.3%, p<0.001) than with EPA (-11.9±2.2%, p<0.001, p=0.005 between treatments). The TG responses to DHA and EPA were moderately correlated (r²=35.8%, p<0.001), but there was significant heterogeneity in the response to both treatments (p=0.002). Among participants with reduced TG after EPA, 16.3% showed an increase with DHA. Among participants with reduced TG after DHA, 26.4% showed an increase with EPA.

Conclusions: The results indicate that high doses of DHA may be more effective than EPA in reducing serum TG levels in men and women at risk for cardiovascular disease. However, data also revealed important intra-individual heterogeneity in the TG response to EPA and DHA, suggesting that individuals who respond favourably to DHA may not necessarily respond favourably to EPA.
SESSION 7 - Lipids/Lipoproteins - Metabolic Syndrome
85-HKJC-152

IMPACT OF A ONE-YEAR LIFESTYLE MODIFICATION PROGRAM ON LIPOPROTEIN SIZE AND CONCENTRATIONS IN MEN WITH CORONARY ARTERY DISEASE

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Background and objectives: To determine whether a 1-year lifestyle modification program aimed at increasing physical activity levels and improving diet quality influences lipoprotein size and concentrations in post coronary artery bypass graft (CABG) patients.

Methods: A total of 86 men aged between 35 and 80 years who underwent CABG surgery participated in a 1-year lifestyle modification program aimed at achieving a minimum of 150 minutes of aerobic physical activity weekly and improving diet quality. Visceral, subcutaneous and cardiac adipose tissue (AT) levels were assessed before and after the intervention using magnetic resonance imaging. Very low-density-, low-density- and high-density lipoprotein size and concentrations were measured by proton nuclear magnetic resonance spectroscopy and a complete lipoprotein-lipid profile was obtained. Cholesterol efflux capacities (CECs) were also measured using J774 cells.

Results: The intervention induced significant increases in HDL cholesterol and apolipoprotein (apo) A-1 levels (+11.9% and +6.2% for HDL cholesterol and apoA-1 levels, respectively, p<0.0001). LDL size, but not HDL and VLDL size were increased following the intervention (0.21 ± 0.44 nm, p<0.0001). Large LDL particles increased (37.8±117.2 nmol/L, p=0.004) while small LDL particles were decreased (-57.6±185.0 nmol/L, p=0.005). Total HDL particles and large particles HDL increased (2.36±4.11 µmol/L, p<0.0001 and 0.46±1.76 µmol/L, respectively). Changes in CECs were associated with changes in HDL cholesterol concentrations (r=0.25, p=0.02) and changes in large HDL particles (r=0.23, p=0.03).

Conclusions: In post CABG patients, increasing physical activity levels and improving diet quality lead to significant and positive changes on lipoprotein particles size and concentrations. Whether lifestyle-mediated changes on lipoproteins influences cardiovascular outcomes needs to be documented in larger scale intervention studies.
DEPTOR OVEREXPRESSION IMPROVES GLUCOSE TOLERANCE, DYSLIPIDEMIA AND CARDIAC FUNCTION IN DIET-INDUCED OBESE MICE

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Background and objectives: The mTORC1/S6K1 pathway is known to play an important role in metabolism, with impact on the development of insulin resistance and cardiac remodelling. mTORC1 inhibition with rapamycin improves obesity-induced cardiac dysfunction in mice. DEPTOR (DEP domain-containing mTOR-interacting protein) is an endogenous mTORC1 inhibitor, but its role in regulating metabolism and cardiac function remains unknown. Our aim was to determine the effect of DEPTOR overexpression on glucose and lipid metabolism as well as cardiac function in obese mice.

Methods: We used a transgenic mouse model in which DEPTOR was overexpressed with doxycycline induction (iDEP). Mice received either a control (LF) or a high-fat (HF) diet for 20 weeks. At this timepoint, doxycycline (200 mg/kg) was added to the respective diet of wild-type (WT) and iDEP mice. The diets were maintained for an additional period of 12 weeks. Glucose and insulin tolerance tests were performed 5 and 8 weeks following the induction of DEPTOR. Circulating and hepatic cholesterol and triglycerides were assessed at sacrifice after a fasting/refeeding protocol. Cardiac function was measured by echocardiography before and after (12 weeks) the induction of DEPTOR.

Results: DEPTOR protein expression increased in the heart and adipose tissue of iDEP mice, however no changes were observed in the liver or the skeletal muscle. Body weight increased following HF diet, but was not changed following DEPTOR overexpression. Nevertheless, iDEP obese mice showed improved glucose tolerance compared to WT obese mice. Circulating and hepatic lipids improved in obese DEPTOR overexpressing mice compared to obese WT mice. Hearts of 20 weeks HF fed obese mice had lower ejection fraction (EF) and fractional shortening (FS) as compared to LF-fed non-obese mice (P<0.05 for both EF and FS). While these cardiac impairments continued to develop for the next 12 weeks in HF-fed WT obese mice, hearts of Deptor overexpressing HF-fed obese mice were significantly protected from such defects (P<0.05 for both EF and FS).

Conclusions: DEPTOR overexpression improves glucose tolerance, lipid profile and cardiac function in HF-fed obese mice. Inhibiting mTORC1 through increased DEPTOR expression represents a potential therapeutical target for metabolic and cardiac dysfunction associated with obesity.
IMPACT OF PERSISTANT ORGANIC POLLUTANTS ON THE EPIGENOME AND ON THE DEVELOPMENT OF METABOLIC SYNDROME

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Background and objectives: The dramatic increase in the number of people affected by metabolic disorders, mostly associated with visceral obesity, calls for a major research effort to increase our understanding of the underlying causes of this epidemic. These disorders include many conditions such as obesity, cardiovascular diseases (CVD), type 2 diabetes and fatty liver disease and are caused by a combination of genetic and environmental factors. Various environmental pollutants, such as persistent organic pollutants (POPs) found in fatty fishes and in some omega-3 dietary supplements are known to accumulate in the adipose tissues once ingested. Our main objective was to determine if these pollutants have an effect on the development of metabolic disorders associated with obesity and if they can modify epigenetics signatures that could predispose future generations to complications similar to those of the directly exposed individuals.

Methods: To test our hypotheses, we used a murine model of nutritional intervention, studied over several generations. This model will allow us to identify the effects of pollutants, both at the metabolic and at the epigenetic level.

Results: Our initial results indicate that POPs predispose to metabolic syndrome and cause changes in epigenetic signatures which are transmitted between generations. Interestingly, we have observed that POPs cause glucose intolerance even two generations after the animals were exposed to them.

Conclusions: Now that we know that these pollutants can promote metabolic alterations over at least two generations, we plan to elucidate the underlying mechanisms at the epigenomic level but also its potential relationship with modifications of the gut microbiota as revealed by metagenomic analyses.
GLYCEMIC INDEX AND METABOLIC SYNDROME AMONG IRANIAN ADULT POPULATION: ISFAHAN HEALTHY HEART PROGRAM

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Background and objectives: There is controversy in clinical effects of dietary glycaemic index (GI) and glycaemic load (GL) on cardiovascular diseases risk factors such as metabolic syndrome. So, this study was performed to evaluate the relationship of GI and GL with Metabolic syndrome in Iranian adult population in 2007.

Methods: The study was based on the data from subsample of [removed for blind peer review], across three cities in central part of Iran, in the year 2007. A cross-sectional survey of 1518 randomly selected adults aged ≥ 19 years. Nutritional assessment was done by a single 24 h recall questionnaire. Fasting serum lipids, anthropometric indicators and blood pressure were measured by standard methods. Analysis of covariance was used to compare metabolic syndrome components according to energy adjusted GI and GL levels. Showing the effect of potential confounders, hierarchical logistic regression models were utilized to determine adjusted odds ratios (OR) 95% CI.

Results: ORs (%95CI) had the highest level adjusted by age, gender, body mass index and energy intake [1.46 (1.01-2.12)] and it was attenuated marginally by excluding the confounding effects of dietary fibre intake [1.29 (1.01-1.74)]. All hierarchical models illustrated no significant association between energy adjusted GL and the risk of metabolic syndrome adjusted by confounders.

Conclusions: There is a positive relationship between dietary GI, but not GL with presence of metabolic syndrome after adjustment for potential confounders. However, studies with long duration of follow-up and experimental studies are required to provide a better level of evidence.
ASSOCIATION OF MAJOR DIETARY PATTERNS AND CARDIOVASCULAR MORTALITY AMONG IRANIAN POPULATION: ISFAHAN COHORT STUDY

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Background and objectives: Evidence about the relation between dietary patterns and cardiovascular disease (CVD) is scarce in Middle-eastern countries. This study was performed to examine the association between major dietary patterns and CVD mortality in Iranian adults.

Methods: This population-based prospective cohort study was done among 4834 randomly selected participants aged ≥35 years in urban and rural areas of central Iran (2001-2009) in Isfahan Cohort Study (ICS). Dietary intakes were assessed using a food frequency questionnaire and major dietary patterns were identified by means of exploratory factor analysis. Subjects or their next of kin were interviewed biannually looking for possible occurrence of events. Cardiovascular mortality was defined as fatal myocardial infarction (MI), fatal stroke, and sudden cardiac death.

Results: During the median follow-up of 9.0 years and 50282 person-years, we found a total of 118 CVD mortalities. Four major dietary patterns were identified: "Western", "Mediterranean", "Animal fat", and "Fast food". Adherence to the Mediterranean dietary pattern was protectively associated with CVD mortality; such that those in the highest quartile were 46% (HR: 0.54; 95% CI: 0.32-0.91; P for trend=0.03) less likely to have incident CVD mortality than those in the lowest quartile. Further adjustment for potential confounders, strengthened this association (HR: 0.42; 95% CI: 0.19-0.96; P for trend=0.02). We found no significant association between adherence to the Western, animal fat and fast food dietary patterns and CVD mortality.

Conclusions: Adherence to a Mediterranean dietary pattern was associated with reduced risk of cardiovascular mortality even in a developing country setting.

| Relative risk of Mediterranean dietary pattern in cardiovascular mortality |
|-----------------------------|-----------------------------|-----------------------------|
|                            | Mortality rate | HR (95% CI) |
|                            | Person-year    |              |
| Q1                          | 35             | 12407.31     | 1.00 |
| Q2                          | 34             | 12750.50     | 0.82 (0.42-1.57) |
| Q3                          | 23             | 12699.96     | 0.42 (0.19-0.92) |
| Q4                          | 24             | 12423.92     | 0.42 (0.19-0.96) |
| P for trend                 |                | 0.02          |

*: Adjusted for age, sex, education, smoking status, daily physical activity, family history of cardiovascular disease, aspirin use, post menopause in women, body mass index.
NUTRITIONAL QUALITY: A KEY INDICATOR OF A HEALTHY LIFESTYLE ASSOCIATED WITH FAVORABLE CHANGES IN THE CARDIOMETABOLIC RISK PROFILE

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Background and objectives: Targeting overall nutritional quality (NQ) has become a worldwide priority in the fight against cardiovascular disease but little is known on its specific contribution to reducing cardiometabolic risk (CMR) at the population level. The present study explored the associations between changes in NQ indices observed in response to a 3-month workplace lifestyle intervention program and changes in CMR variables.

Methods: Before and after a 3-month workplace lifestyle modification program, 1485 participants went through various tests (waist circumference [WC], lipid profile, submaximal treadmill exercise test to estimate VO2max and to obtain heart rate at 3.5 mph, 2% slope). Subjects were also asked to complete standardized questionnaires on lifestyle (NQ and physical activity level [PAL]). Spearman correlations and multivariate stepwise regression analyses were performed by sex. Sub-scores of food items of the NQ questionnaire were calculated to investigate their specific contributions to CMR profile.

Results: Changes in NQ were correlated with changes in WC and in triglyceride (TG) concentrations in men (r = -0.24 and -0.17 respectively, P<0.001) and in women (r = -0.13; -0.23, P<0.01). NQ explained the largest percentage of the variation of WC and TG in both men and women (men: R²X100 = 12.5; 3.5, women: R²X100 = 9.5; 7.6, P<0.001). Changes in PAL were also correlated with changes in WC and in TG (men: r = -0.24; -0.14, women: r = -0.16; -0.21, P<0.05). Changes in Sweets, Whole grains and Added fats sub-scores were the best predictors of changes in WC (r = -0.20; -0.12; -0.15, P<0.001) and in TG (r = -0.14; -0.11; -0.13, P<0.01) among men. These three sub-scores explained 9.8% of the variation in WC and 5.7% of TG changes (P<0.001). In women, changes in Milk and Fish sub-scores were more strongly associated with changes in WC (R²X100 = 6.7; 2.8, P<0.05) whereas changes in Total vegetables explained 11.8% of changes in TG concentrations (P<0.001).

Conclusions: Improvements in NQ and PAL observed in response to a 3-month workplace intervention targeting lifestyle behaviors are independently associated with beneficial changes in the CMR profile. Different food items of the NQ questionnaire appear to display differential associations with changes in the CMR profile in women vs. men.
CONSUMPTION OF ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES IN RELATION TO LIVER FAT CONTENT: THE NEO STUDY

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Background and objectives: Non-alcoholic fatty liver (NAFL) is the leading cause of chronic liver diseases and associated with cardiovascular disease. Whereas the effect of excessive alcohol consumption on fatty liver is clear, the effect of alcohol consumption on liver fat content in the general population is not completely elucidated. Moreover, energy-containing non-alcoholic beverages may contribute to liver fat accumulation. Therefore, we aimed to study alcoholic beverage consumption and replacement with non-alcoholic beverages in relation to hepatic triglyceride content (HTGC) in middle-aged men and women.

Methods: In this cross-sectional analysis of the Netherlands Epidemiology of Obesity study, HTGC was assessed by proton-MR spectroscopy. Habitual consumption of alcoholic and non-alcoholic beverages (coffee, tea, milk, sugar-sweetened beverages, non-alcoholic beer) was assessed using a food frequency questionnaire. All beverages were converted to units, each alcoholic unit containing 10 grams of alcohol, and to percent of total energy intake (En%). We performed linear regression to examine the association of alcoholic beverages with HTGC, adjusted for sex, age, smoking, education, ethnicity, physical activity, and total energy intake. We studied replacement of alcoholic beverages with non-alcoholic beverages per unit/day and per 10 En%/day.

Results: After exclusion of participants with missing values (n=98), 1,967 participants (47% men) were analysed, with a mean (SD) age of 55 (6) years, BMI of 26 (4) kg/m², and HTGC of 5.7% (7.9). One unit of alcoholic beverages per day was associated with 1.09 times more HTGC (95% CI: 1.06, 1.13). Replacing one unit of alcoholic beverages with one unit of non-alcoholic beverages was associated with less HTGC (0.95; 0.89, 1.01). Replacing 10 En% of alcoholic beverages with 10 En% of non-alcoholic beverages was not associated with less liver fat (0.99; 0.97, 1.02).

Conclusion: In a population-based cohort, consumption of alcoholic beverages was associated with a higher liver fat content. Replacing one unit of alcoholic with non-alcoholic beverages was associated with less liver fat. However, in isocaloric replacement of alcoholic beverages non-alcoholic beverages were similarly associated with liver fat, suggesting that both alcohol and energy intake contribute to liver fat accumulation.
COMPARING THE IMPACT OF SATURATED FATTY ACIDS FROM DIFFERENT DAIRY SOURCES ON THE PROTEOME OF HIGH DENSITY LIPOPROTEINS

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Background and objectives: High-density lipoproteins (HDL) play different protective roles in the etiology of atherosclerosis. The anti-inflammatory and antioxidant properties of HDL are of particular interest in that regard. Because dietary saturated fat (SFAs) are known to increase HDL-C concentrations, we were interested to investigate how consumption of SFAs from different dairy sources modifies the proteomic profile of HDL compared to other dietary fats (monounsaturated - MUFA and polyunsaturated - PUFA) and a low-fat/high carbohydrate diet.

Methods: A randomized crossover controlled trial was conducted in 42 men and women with abdominal obesity and relatively low HDL-C. Subjects were assigned to sequences of 5 isoenergetic diets of 4 weeks each: 1) a diet rich in SFA from cheese; a diet rich in SFAs from butter; a diet rich in MUFA; a diet rich in PUFA and a low-fat, high carbohydrate diet (CHO). All foods were provided to the participants during the experimental phases. HDL’s proteome was assessed by mass-spectrometry (MS) after isolation of the HDL fraction by sequential ultracentrifugation after each treatment.

Results: Using conservative analytical procedures, a total of 66 unique proteins were quantified in the HDL fraction. There was no difference between any diets in the levels of HDL proteins known to be involved in oxidative processes and acute phase response. CHEESE increased levels of HDL proteins related to immune response, namely angiotensinogen (vs. BUTTER, P<0.05), Ig gamma-1 chain C region, platelet basic protein and vitronectin (vs. CHO, P<0.05). BUTTER increased levels of vitronectin (vs CHO, P<0.05) but had no effect on other immune response proteins. Apolipoproteins A-IV and C-IV, which play key roles in cholesterol homeostasis, were significantly increased after CHEESE (vs. CHO, P<0.05) but not after BUTTER.

Conclusions: This full-feeding study suggest that SFAs from butter and cheese have no influence on the antioxidant and anti-inflammatory properties of HDL compared with other dietary fats and CHO. However, immune response and cholesterol homeostasis proteins were modified by cheese but not by butter in comparison with CHO, consistent with a modest food matrix effect modifying the impact of SFAs on cardiometabolic health. Functional studies are necessary to confirm these findings.
EFFECTS OF SATURATED FATTY ACIDS FROM BUTTER AND CHEESE ON HIGH-DENSITY LIPOPROTEIN (HDL)-MEDIATED CHOLESTEROL EFFLUX CAPACITY

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Background and objectives: The association between dietary saturated fat (SFA) intake and cardiovascular disease risk remains controversial. Emerging data suggest that SFA from different sources may show different association with cardiovascular and cardiometabolic risk. The objective of this study was to examine how SFA from cheese (CHEESE) influences HDL-mediated cholesterol efflux capacity (CEC), a key anti-atherogenic property of HDL, compared with a low fat/high carbohydrate diet (CHO), a diet rich in SFA from butter (BUTTER) and diets either high in monounsaturated (MUFA) or polyunsaturated fatty acids (PUFA).

Methods: A total of 46 men and women with abdominal obesity and with relatively low HDL-C concentrations completed this randomized crossover controlled trial consisting of 5 predetermined isoenergetic diets of 4 weeks each: 1) CHEESE, 2) BUTTER, 3) MUFA, 4) PUFA, 5) CHO. All foods were provided to participants during each experimental diet. CEC was assessed with radiolabelled J774 macrophages using apolipoprotein B depleted serum samples taken from participants at the end of each dietary phase. HDL lipid composition (gas chromatography) and HDL particle size distribution (polyacrylamide gradient gel electrophoresis) were also assessed.

Results: All higher fat diets increased HDL-C levels compared to CHO (all \(p<0.001\)). BUTTER and CHEESE increased LDL-C more than CHO, MUFA and PUFA diets, particularly among individuals with high baseline LDL-C (all \(p<0.001\)). LDL-C concentrations tended to be greater after BUTTER than after CHEESE (\(p=0.07\)). BUTTER, PUFA and CHEESE significantly increased large HDL2b levels compared to CHO (all \(p<0.01\)). BUTTER also increased HDL2b levels more than MUFA (\(p=0.04\)). There was no difference in HDL-mediated CEC between CHEESE and CHO (\(p=NS\)). BUTTER increased HDL-mediated CEC compared with CHEESE and CHO (both \(p<0.05\)). MUFA also increased CEC compared with CHEESE and CHO (both \(p<0.05\)). PUFA had no significant effect on HDL-mediated CEC compared with the others diets. The increase in LDL-C after BUTTER (vs. CHO) was significantly correlated with concurrent increase in CEC in men only (\(r=0.44\), \(p=0.04\)).

Conclusions: These results provide evidence of a matrix effect modulating the effects of dairy SFA on HDL characteristics and function, with greater changes seen with SFA from butter than with SFA from cheese.
DIET QUALITY IN EEYOUCH POPULATION (JAMES BAY, QUEBEC): INVESTIGATING ITS RELATION WITH THE PREVALENCE OF METABOLIC SYNDROME

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Background and objectives: To assess associations between three diet quality indices and metabolic syndrome (MetS) in the Cree (Eeyouch) of northern Québec Canada.

Methods: 811 Eeyouch (≥18 years old) from seven James Bay communities participated in the 2005-09 cross-sectional “Nituuchischaayihititaa Aschi” Environment-and-Health study. The alternative-Healthy Eating Index (aHEI-2010), the Food Quality Score (FQS) and the contribution of ultra-processed products (UPP) to the total dietary energy intake using the NOVA classification were calculated from 24-hour food recalls. MetS was determined with the International Diabetes Federation (IDF) definition. Logistic regressions assessed the relationship between quintiles of dietary quality scores with MetS and its components.

Results: MetS prevalence was 56.5% with 95.4% abdominal adiposity, 50.1% elevated fasting plasma glucose, 43.4% high blood pressure, 38.6% elevated triglycerides and 44.5% reduced high-density lipoprotein-cholesterol. Diet quality score average was 29.9±8.5 (SD) for aHEI-2010, 38.2±6.4 for FQS, and 51.9±23.9% for the contribution of UPP to the total daily energy intake. Comparing highest to lowest quintiles of scores, adjusted odds ratios (ORs) of MetS was 0.63 [95% CI: 0.38-1.05; p-trend=0.05] for aHEI-2010, 1.04 [95% CI: 0.62-1.74; p-trend=0.87] for FQS and 1.93 [95% CI: 1.15-3.21; p-trend=0.04] for the contribution of UPP to the total dietary energy intake.

Conclusions: Although diet quality indices have been associated with cardiometabolic risk, only the dietary intake of UPP was significantly associated with MetS in the Eeyouch. Indices tailored to the food environment of northern communities are essential to further understand the impact of diet quality in this context.
THE POLYPHENOL-PROTEIN INTERACTOME – A FOOD-COLOUR BASED ANALYSIS

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Background and objectives: Polyphenol-rich foods have been part of many nutritional interventions aimed at improving health and preventing cardiometabolic diseases (CMDs). The proposed beneficial, namely cardioprotective, properties of polyphenols indicate their ability to modulate oxidative, inflammatory and/or metabolic processes. The objectives of this project were thus to assess the functional roles of polyphenols through the involvement of their protein interactome in biological systems and to evaluate whether polyphenol composition and associated functions differ by foods of the 5 popular colour-groups.

Methods: Polyphenols and their metabolites were retrieved from the PhenolExplorer database and the Dictionary of Natural Products (DNP) and their protein interactions were mined from the Stitch, PathwayCommons and BindingDB databases. Biological pathway enrichments were performed using the polyphenol interactome in the KEGG and Reactome pathway repositories. Enrichments with Bonferroni-Hochberg adjusted p-values below 0.1 and that exceed a pathway coverage of 20% were considered significant.

Results: A total of 1,395 polyphenols and their metabolites were retrieved from PhenolExplorer and the DNP and 11,987 interactions (with 5,699 unique proteins) were found for 369 of these compounds. Pathway enrichments resulted in a great number of significant pathways that for the most part were non-specific to particular polyphenol (sub)class demonstrating a large pleiotropic effect of polyphenols across multiple biological systems. Moreover, natural, unprocessed food items did not cluster into their respective colour-groups. For the most part, pathway enrichments suggested that the polyphenol content is not significantly different between colour-groups. Notwithstanding these observations, some pathways associated with development and progression of CMDs and their risk factors were enriched by few subclasses of compounds or specific food-groups. Upon completion of ongoing analyses, these highlighted subgroups could be useful in efforts to prevent or modulate CMD development.

Conclusions: This novel computationally-driven study demonstrates the pleotropic effects of polyphenols and metabolites thereof on metabolism. By considering all polyphenol in vivo metabolites in addition to the often-favoured food-polyphenols and by accounting for all protein interactions, this project is more reflective of polyphenols’ potential and systems-wide effects. These findings will aid highlighting polyphenol subclasses or polyphenol-rich food groups able to mediate CMD onset.
THE ACCEPTABLE MACRONUTRIENT DISTRIBUTION RANGES AND DYSLIPIDEMIA IN KOREAN ELDERLY

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Background and objectives: South Korea is confronting extreme demographic ageing society, whereas healthy life expectancy does not correspond its rapid change. Moreover large scale study on risk factors that affects elderly’s metabolic diseases is significantly insufficient. Therefore as an attempt to reduce increasing medical expenditures and foster building physical and social infrastructures, we are conducting a cohort study to thoroughly examine the risk factors in relation with elderly health problems. According to Dietary Reference Intakes for Koreans 2015, the AMDR(Acceptable Macronutrient Distribution Range) suggests to consume 55-65% of carbohydrate, 20% of protein, 7-20% of fat for adults. Therefore as part of a present study, we analysed the relationship between the suggested nutrient intake and the risk of metabolic diseases based on the collected data.

Methods: This study aims to conduct three year follow up for 1000 participants. However, since the present study is undergoing its first baseline, we collected cross sectional data from the baseline to analyse a total of 83 men and 118 women aged over 60 year old. The data consists of three day dietary record (randomly chosen two weekdays and one weekend) which was analysed by Can-pro ver5.0 invested by the Korean Nutrition Society and blood sample analysis of 201 individuals (58.7% women).We divided the macronutrient consumption rate into three groups (<AMDR, within AMDR, >AMDR). The study is analysed with IBM SPSS statistics version 20.0 for windows and P <0.05 was considered significant.

Results: The logistic regression statistic analysis was used to evaluate the relationship between AMDR difference and dyslipidemia (co variants: age, BMI, energy intake, SBP, DBP, FBS, HbA1c, total cholesterol). There was no significant difference between three AMDR groups in both men and women but we found that higher BMI is associated with higher risk of dyslipidemia. The odds ratio was 1.56 (95 % CI, 1.04 - 2.33).

Conclusions: Our findings suggest there is no significant association between AMDR and dyslipidemia, therefore further studies with large participants are needed to clarify the relationships between the nutrient and metabolic diseases.
ASSOCIATIONS AMONG EATING BEHAVIOUR TRAITS, DIET QUALITY AND FOOD LABELLING: A MEDIATION MODEL

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Background and objectives: Eating habits are influenced by several factors including eating behaviour traits, nutrition knowledge and food label use. The aim of this study was 1) to assess the association among eating behaviour traits, food labels knowledge and use, and diet quality and 2) to evaluate if the association between eating behaviour traits and diet quality is mediated by food label knowledge and use.

Methods: Data from 508 men and women (BMI=26.0±4.9 kg/m², age=41.1±15.0 years) involved in two previous studies were used in this cross-sectional study. Eating behaviour traits were assessed using the Three-Factor Eating Questionnaire (TFEQ), the Restraint Scale and the Intuitive Eating Scale whereas food label knowledge and use were measured with the Label Reading Survey. Diet quality (Canadian Healthy Eating Index) was assessed with a food frequency questionnaire (FFQ).

Results: Multivariate regression analyses showed that general food label use (β=0.87, p=0.005), TFEQ-cognitive restraint (β=0.38, p=0.02), and knowledge of food labels (β=1.06, p=0.03) predicted diet quality in women, whereas general food label use predicted diet quality in men (β=1.32, p=0.0008). Moreover, general food label use mediated 28.6% of the association between TFEQ-cognitive restraint and diet quality in women (p=0.006).

Conclusions: Cognitive restraint, as assessed by the TFEQ, and food label use seem to be a determinant of diet quality in women, whereas, eating behaviour traits seem to have less influence on men’s dietary habits, since their diet quality was predicted by food label use.
IMPACT OF WILD BLUEBERRIES POLYPHENOLIC EXTRACTS AGAINST METABOLIC DISORDERS IN A MOUSE MODEL OF DIET-INDUCED OBESITY

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Background and objectives: Given the endemic prevalence of obesity, it is essential to identify strategies that could prevent metabolic disorders related to obesity. It has been proposed that wild blueberries (WB) (V. angustifolium ait) consumption could prevent many of those disorders. Moreover, dysbiosis of the gut microbiota can partly explain the incidence of those disorders. Indeed, recent studies have documented the close relationship between the consumption of dietary polyphenols and the modulation of the gut microbiota. Many polyphenols such as proanthocyanins (PACs) reach the colon intact and can interact/affect the microbiota. Therefore, the objective of the present study was to assess the protective effects of different WB polyphenols fractions on dysbiosis and obesity-associated metabolic disorders.

Methods: To test this hypothesis, 5 groups of C57BL/6 mice were fed a high-fat high-sucrose diet (HFHS) for 8 weeks while receiving daily gavage with either the vehicle (water) or one of four WB extracts: a total polyphenol extract, PAC/phenolic acid-rich fraction of the total extract, a flavonol and oligomeric flavan-3-ol fraction (dp<3) and a PAC polymer fraction (dp>4). A chow fed group, receiving daily gavage of the vehicle, was also included as a health reference group. Insulin and glucose tolerance tests were performed at 6 and 8 weeks of treatment, respectively. Body weight and food intake were measured weekly.

Results: Among HFHS fed groups, we did not observe any change in the body weight gain or food intake. However, glucose tolerance tests revealed that mice receiving PAC polymers might be particularly beneficial for glucose homeostasis by reducing glucose intolerance. Interestingly, caecum weight in the WB total extract group was significantly increased as compared to the HFHS vehicle treated group, suggesting an additional effect of WB polyphenols on the gut microbiota.

Conclusions: Our data suggest that PACs are the key polyphenols involved in the beneficial effects of WB consumption on metabolic health. Further analyses are underway to assess whether these metabolic effects of WB PACs can be linked to modulation of the gut microbiota, and thereby to the improvement of obesity-related metabolic disorders.
MODULATION OF THE GUT MICROBIOTA IN OBESITY-LINKED METABOLIC SYNDROME BY ENDogenous AND EXOGENous OMEGA-3 PUFA

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Background and objectives: Dietary omega-3 polyunsaturated fatty acids (n-3 PUFA) and n-3 PUFA levels restoration via the fat-1 desaturase expression are known to improve glucose homeostasis and insulin sensitivity in high-fat(HF)-fed obese mice. Obesity has been linked to shifts in gut bacterial community, however it remains unclear whether n-3 PUFA can influence the gut microbiota. We thus aimed to determine whether dietary (exogenous) and level restoration (endogenous) of n-3 PUFA can improve metabolic syndrome and hepatic steatosis via changes in the gut microbiota.

Methods: Wild-type and hemizygous C57BL/6 fat-1(+/−) male mice were fed either HF or low-fat(LF) diet, while receiving daily gavage with omega-3 or omega-6 PUFA during 12 weeks. Insulin and glucose tolerance tests were performed, hepatic and plasma lipids were measured, as well as tissue inflammation and caecal short chain fatty acids (SCFA) content. Fecal samples were harvested before and after the treatment, and bacterial community composition was determined using 16S rRNA gene Illumina MiSeq sequencing.

Results: Both exogenous (gavage) and endogenous (fat-1 expression) n-3 PUFA tended to decrease body weight gain and tissue inflammation induced by HF diet. However, endogenous n-3 PUFA were more likely to improve insulin sensitivity and glucose homeostasis (enhanced insulin sensitivity and glucose tolerance, lower HOMA-IR index) whereas exogenous n-3 PUFA were more likely to counteract HF diet-linked hepatic steatosis (decrease liver weight and triglycerides content) and modulate SCFA levels and plasmatic lipids. Moreover, a major shift in bacterial populations was observed in HF-fed mice compared to LF-fed mice, particularly a decrease in the abundance of the Erysipelotrichales order (predominantly explained by the Allobaculum genus) and a relative increase in Clostridiales. Interestingly, both exogenous and endogenous n-3 PUFA reversed this HF-mediated shift in the gut microbiota profile, where we observed a significant increase in the abundance of the Erysipelotrichaceae family, with significant increase in Allobaculum in the gavaged mice.

Conclusions: These results showed that endogenous and exogenous n-3 PUFA modulates gut microbiota in the same way, suggesting that PUFA status may influence obesity-linked diseases through regulation of Allobaculum abundance.
EFFECTIVENESS OF A MOBILE PHONE INTERVENTION FOR MANAGEMENT OF METABOLIC SYNDROME COMPONENTS FOCUSING ON WEIGHT LOSS

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Background and objectives: Obesity is a core component in metabolic syndrome. Weight management is essential to reduce many diseases related with metabolic syndrome. We investigated the efficacy of a mobile application (Noom smartphone application) for weight loss in overweight or obese Korean adults.

Methods: A total of 104 subjects aged 38.7 ± 8.4 years with BMI ≥ 23 kg/m² were included in this study. Participants were instructed to use Noom’s food logging, exercise logging, and private message function every day. The primary endpoint of the study was change in body weight for 15 weeks. The secondary endpoints were changes in metabolic syndrome risk factors such as blood pressure, waist circumference, and glucose and lipid profiles. Body composition change from baseline to 15 week was also assessed. To ascertain the long-term effect, change in weight at 52 week was evaluated.

Results: The compliance of using the application was 72.9%. Body weight decreased significantly by 6.5 kg at week 15 from baseline (P < 0.001). Weight loss was slightly attenuated but remained significantly at week 52 from baseline (-4.4 ± 5.4 kg, P < 0.001). Percent body fat and abdominal visceral fat showed significant decrease at week 15 (-6.0 ± 5.4% and -3.4 ± 2.7 kg, P < 0.001, respectively). In multiple regression analysis after adjusting for age and gender, percent body fat loss was associated with the numbers of application meal logging at week 6 (β = 0.008, P = 0.016) and those of exercise logging at week 15 (β = 0.046, P = 0.008). The proportion of subjects with metabolic syndrome was also decreased by about 50% after intervention.

Conclusions: In this study, the mobile application focusing on weight loss with behavioral coaching in overweight or obese adults for 15 weeks showed clinically significant weight loss effect and sustained up to 1 year. These data suggest that advanced mobile application with sophisticated program that guides behavioral modification is a useful tool to maintain weight loss as well as to decrease body weight in obese subjects.
IMPACT OF BARIATRIC SURGERY AND A 12-WEEK SUPERVISED EXERCISE TRAINING PROGRAM ON FUNCTIONAL CAPACITY

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Background and objectives: Severe obesity is a condition associated with numerous comorbidities as well as functional incapacity. As of today, bariatric surgery is the most effective long-term treatment for the management of severe obesity. The purpose of this study was to measure functional capacity of severely obese patient before and after bariatric surgery.

Methods: Patients (n=60) were randomized either in a supervised exercise training program group (exercise group, n=40) or usual care without personalized physical activity follow-up group (control group, n=20). For all patients, anthropometric measurements (waist circumference and bioimpedance analysis), 30 seconds sit-to-stand test and hand grip strength test were performed before, at 3 and 6 months after bariatric surgery. Between 3 to 6 months, patients in the exercise group were encouraged to perform at least 3 times per week, 60 minutes of supervised exercise training that included aerobic and resistance training.

Results: A total of 52 patients were included in this analysis (35 exercise, 17 control). At baseline, groups were similar for the proportion of women (77 vs. 71%; exercise vs. control respectively), age (42+/−12 vs. 41 +/−12 years), waist circumference (132.8 +/-11.5 vs. 134.2+/-12.6 cm), body mass index (46.5+/−6.4 kg/m$^2$ vs. 44.5+/−5.0 kg/m$^2$), number of repetition during the sit-to-stand test (11+/−3 vs. 11+/−2) and the hand grip strength (64+/−20 vs. 62+/−21 kg). At 3 months, post-operative changes were similar between groups. During the exercise period (between 3 to 6 months), the reduction of anthropometric measurements was similar, but for the exercise group, there was an increase in the number of repetition during the sit-to-stand test (2+/−2 vs. 0+/−1 kg; p=0.003) and a trend (p=0.090) for toward a greater increase of handgrip strength in the control group (0+/−9 vs. 4+/−8 kg). However, at 6-month, hand grip strength was similar between groups (64+/−24 vs. 63+/−19 kg).

Conclusion: Our data suggest that supervised exercise training had a positive effect on the sit-to-stand functional capacity without having one on the hand grip strength.
SESSION 10 - Obesity - Pathophysiology/Basic Science/Animal Studies
85-VNLG-242

EARLY WEIGHT LOSS RESPONDERS TO LIRAGLUTIDE 3.0 MG HAD GREATER WEIGHT LOSS VS EARLY NON-RESPONDERS: SCALE OBESITY AND PREDIABETES

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Background and objectives: The SCALE Obesity and Prediabetes (NCT01272219) trial randomized adults with prediabetes and obesity (BMI ≥30 kg/m²) or overweight with comorbidities (≥27 kg/m²; dyslipidemia/hypertension) to liraglutide 3.0 mg (N=1505) or placebo (N=749) as adjunct to diet and exercise for 3 years.

Methods: This post hoc analysis compared liraglutide 3.0 mg early responders (ERs; ≥5% weight loss [WL] at Week [W] 16) and early non-responders (ENRs; <5% WL at W16), in keeping with EMA & Canadian stopping-rule criteria. Efficacy outcomes are estimated means in ERs (n=580) and ENRs (n=210) who completed 160 weeks’ treatment. Those developing T2D/regression to normoglycemia were analyzed on the full analysis set with LOCF. Safety was based on the safety analysis set. Placebo data are shown only for proportion of ERs/ENRs.

Results: Of those with W16 data, for liraglutide 3.0 mg (n=1302) 68.0% were ERs and 32.0% ENRs; for placebo (n=640), 22.3% were ERs and 77.7% ENRs. At W160, greater mean and categorical WL, reduced development of T2D, greater regression to normoglycemia and greater clinical and patient-reported improvements were observed in ERs to liraglutide 3.0 mg vs ENRs (Table). Adverse events (AEs) and GI AEs were similar between groups; serious AEs and gallbladder disorders were more frequent in ERs (Table).

Conclusions: Among those treated with liraglutide 3.0 mg for 160 weeks, greater benefits were seen in ERs vs ENRs; overall AE rates were similar.

### Results Table

<table>
<thead>
<tr>
<th>Week 6–160</th>
<th>Early responders to liraglutide 3.0 mg, n=580</th>
<th>Early non-responders to liraglutide 3.0 mg, n=210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in body weight (%)</td>
<td>-9.6</td>
<td>-2.9</td>
</tr>
<tr>
<td>Change in body weight (kg)</td>
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<td>-3.1</td>
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<tr>
<td>Proportion achieving ≥5% weight loss (%)</td>
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<td>33.3</td>
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<td>Proportion achieving ≥10% weight loss (%)</td>
<td>36.7</td>
<td>14.1</td>
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<tr>
<td>Proportion achieving ≥15% weight loss (%)</td>
<td>19.0</td>
<td>6.5</td>
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<tr>
<td>Proportion developing T2D (%)</td>
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<td>3.2</td>
</tr>
<tr>
<td>Proportion regressing to normoglycemia (%)</td>
<td>69.8</td>
<td>55.4</td>
</tr>
<tr>
<td>Change in FPG (mg/dL)</td>
<td>-7.76</td>
<td>-5.71</td>
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<tr>
<td>Change in FPG (mmol/L)</td>
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<td>-0.32</td>
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<tr>
<td>Change in HbA1c (%)</td>
<td>-0.44</td>
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<tr>
<td>Change in SBP (mmHg)</td>
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<tr>
<td>Change in SF-36 physical component summary score</td>
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<td>+1.61</td>
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<tr>
<td>Change in SF-36 mental component summary score</td>
<td>+13.40</td>
<td>+9.53</td>
</tr>
<tr>
<td>AE (%)</td>
<td>67.1</td>
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<td>Serious AEs (%)</td>
<td>17.7</td>
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<tr>
<td>Gastrointestinal AEs (%)</td>
<td>75.3</td>
<td>71.6</td>
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<tr>
<td>Gallbladder disorders (%)</td>
<td>6.9</td>
<td>2.2</td>
</tr>
</tbody>
</table>

n=580 (early responders), n=210 (early non-responders). Increase in score=improvement.
ACUTE AND CHRONIC IMPACT OF BARIATRIC SURGERY ON PLASMA AUTOTAXIN LEVELS IN PATIENTS WITH SEVERE OBESITY

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Background and objectives: Patients with severe obesity are at higher risk of developing chronic diseases such as cardiovascular diseases (CVD). Bilipancreatic diversion with duodenal switch (BPD-DS) surgery is the most effective bariatric surgical procedure to induce weight loss and to improve the cardiometabolic risk profile. Autotaxin (ATX) is a lysophospholipase D derived from adipose tissue involved in lysophosphatidic acid generation. Autotaxin could be involved in obesity-related complications such as CVD. The impact of bariatric surgery on circulating ATX levels is unknown. The objective is to determine the short term (24-hr, 5 days) and long term (6 and 12 months) impact of bariatric surgery, and of caloric restriction (1 to 3 days) on plasma ATX levels in severely obese patients.

Methods: We measured ATX levels by ELISA in 69 severe obese men and women (mean age: 41.2 ± 11.0 years, BMI: 49.8 ± 7.1 kg/m²), before and after a BPD-DS surgery. Fasting blood samples were collected before the surgery, at 24 hours, 5 days as well as at 6 and 12 months after surgery. ATX levels were also measured in a control group (severe obese without surgery; n=34), at baseline, 6 months and 12 months. To further investigate the effect of caloric restriction induced by the surgery, we measured ATX in seven patients with severe obesity and type-2-diabetes who underwent a 3-day caloric restriction alone then-3 days after a BPD-DS surgery.

Results: Autotaxin concentrations decreased by 26.2% 24h after BPD-DS-surgery (342.9 ± 152.3 pg/ml initially and 253.2 ± 68.9 pg/ml at 24h, p<0.0001) and by 17.3% at 6 months and 16.4% at 12 months (286.8±182.6-pg/ml at 12 months, p=0.04), compared to initial concentration before surgery. ATX levels were unchanged during follow-up in the control group (p=0.4). Following a 3-day caloric restriction, ATX levels decreased by 10% (264.7±111.46 pg/ml initially and 237.1±59.1 pg/ml after 1 day) following caloric restriction, (p=-0.13) whereas ATX was reduced by 33.5% (284.9 ± 119.6pg/ml initially and 199.31± 62.2 pg/ml after 1 day, p=-0.03) after surgery

Conclusions: In patients with severe obesity, BPD-DS-surgery induced a rapid decrease in ATX plasma levels, which appeared to be maintained over time.
TRAJECTORIES OF ALTERNATE ADIPOSITY MEASURES IN YOUTH: DO THEY TELL THE SAME STORY?

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Background and objectives: There is increasing interest in trajectories of body mass index (BMI) in youth to predict cardiovascular outcomes later in life. However, numerous studies suggest that BMI is not an ideal measure of adiposity. We compared sex-specific BMI trajectories with trajectories of other adiposity measures.

Methods: Data were drawn from 4 waves of the NDIT Study, a prospective investigation of 1294 students in Montreal, in which BMI, waist circumference, and triceps and subscapular skinfold thickness were measured at ages 12, 15, 17 and 24. Group-based trajectory models identified distinct trajectories of adiposity measures. Concordance between classification of students in BMI trajectories (from low (1) to high (5)) and alternate adiposity measures trajectories were assessed using Kendall-tau coefficients.

Results: With the exception of triceps and subscapular skinfold in females, 5 trajectories were identified for all other adiposity measures. Kendall-tau coefficients of concordance between BMI trajectories and the other trajectories ranged from 0.60 to 0.75 in males, and 0.44 to 0.69 in females.

Conclusions: Sex-specific trajectories of BMI have moderate concordance with trajectories of other adiposity measures in youth. Trajectories of BMI and other adiposity measures may capture different aspects of adiposity, and therefore may not be used interchangeably.
DIETARY AND ERYTHROCYTE FATTY ACID PROFILES AND ADIPOSITY MARKERS IN BREAST CANCER PATIENTS

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Background and objectives: Obesity is a known risk factor for breast cancer, particularly in postmenopausal women, and is associated with poor survival in breast cancer patients. Some studies suggest that fatty acids, particularly omega-3 fatty acids, are associated with decreased adiposity in healthy individuals. The objective of the present study was to evaluate the relationship of dietary and erythrocyte fatty acid profiles with adiposity markers in breast cancer patients.

Methods: A validated semi-quantitative food frequency questionnaire was used to estimate dietary intakes of 162 breast cancer patients at a breast cancer reference center. Blood samples and standardized anthropometric measures [body weight (BW), body mass index (BMI), waist circumference (WC), hip circumference (HP) and waist-to-hip ratio (WHR)] were collected before any treatment. Erythrocyte membrane fatty acid composition was measured using capillary gas chromatography. Spearman partial rank correlation coefficients were used to evaluate the relationship of dietary and erythrocyte fatty acid profiles, and adiposity markers.

Results: Dietary and erythrocyte fatty acid profiles were only correlated for docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) (adjusted r of 0.51 and 0.44 respectively, p<0.001). Dietary intake of trans fatty acids (TFA) was correlated with BMI (r=0.16; p=0.043), WC (r=0.18; p=0.023) and WHR (r=0.19; p=0.019), while dietary intake of long-chain omega-3 was inversely correlated with WHR (r=-0.19; p=0.018), particularly alpha-linolenic acid (ALA, r=-0.16; p=0.052) and eicosapentaenoic acid (EPA, r=-0.16; p=0.039). Erythrocyte saturated fatty acid content (SFA) was correlated with BW (r=0.18; p=0.025) and BMI (r=0.15; p=0.066), whereas linolenic acid content (LA) was inversely correlated with BW (r=-0.28; p=0.0005), BMI (r=-0.31; p=0.0001), WC (r=-0.27; p=0.0006), HP (r=-0.27; p=0.0008) and WHR (r=-0.15; p=0.065). Erythrocyte alpha-linolenic acid content (ALA) was correlated with WHR (r=0.18; p=0.029), whereas DHA content was inversely correlated with BMI (r=-0.15; p=0.062), WC (r=-0.18; p=0.025), and WHR (r=-0.22; p=0.006).

Conclusions: With the exception of DHA and EPA, erythrocyte fatty acids seem unrelated with their dietary intake. Adiposity markers seem to be higher with high TFA dietary intake, erythrocyte SFA as well as erythrocyte ALA and seem to be lower with high omega-3 intakes, erythrocyte LA and erythrocyte DHA.
SESSION 10 - Obesity - Pathophysiology/Basic Science/Animal Studies
85-9Z2S-152

INTERSCAPULAR BROWN ADIPOSE TISSUE THERMOGENESIS IS NOT REQUIRED FOR CENTRAL LEPTIN SIGNALLING-INDUCED BODY WEIGHT LOSS

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2North Florida/South Georgia Veterans Health System, Gainesville, FL, United States

Background and objectives: Interscapular brown adipose tissue (iBAT) thermogenesis is the putative mechanism underlying leptin-induced body weight loss. However, the importance of iBAT thermogenesis to the overall leptin response has never been established. Although it known to contribute to thermogenesis, animals with compromised, iBAT function can adapt to cold environment and can be resistant to high fat diet-induced obesity. Therefore, we postulated that iBAT thermogenesis may be dispensable for leptin-induced body weight loss.

Methods: We conducted two separate studies using F344xBN rats (n= 40/study) submitted to either a bilateral denervation of iBAT or a sham operation (Sham). Afterwards, animals from each group were centrally delivered leptin or GFP (control) through a single injection of recombinant adeno-associated virus into the third ventricle (n=8-12/group; Sham-GFP, Sham-leptin, iBAT-denervated-GFP or iBAT-denervated-leptin). Daily body weight, food intake, and weekly analysis of body composition were recorded for 14 days (Study 1) and 35 days (Study 2).

Results: Sham-leptin rats lost significant amount of body weight reaching maximal loss at day 28 (P < 0.001). Body composition analysis, shows that fat mass and lean body mass accounted for 35 and 65% of maximal body weight loss, respectively. Additionally, in Sham-leptin rats, food intake dropped by 50% (P < 0.001) during 14 days and rose back to Sham-GFP group level over the rest of the experiment. Unexpectedly, neither body weight/composition changes nor food intake were affected by iBAT denervation in Study 1 or Study 2. Indeed, iBAT-denervated-leptin rats lost as much weight as did Sham-leptin animals with a similar distribution of fat and lean body mass loss and underwent a similar anorexic phase. In summary, iBAT denervation did not prevent body weight loss following central leptin gene delivery.

Conclusions: The present data suggests that iBAT thermogenesis is dispensable for central leptin signalling-induced body weight loss.
FEEDING SCHEDULE DOES NOT APPEAR TO PLAY A ROLE ON ENERGY HOMEOSTASIS IN RATS

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Background and objectives: The importance of feeding schedule on energy homeostasis is gaining attention. Limiting the access to food during the active phase, termed intermittent fasting or time-restricted feeding (TRF), can prevent or reverse diet-induced obesity without the necessity of reducing daily caloric intake. However, all conclusive studies were conducted in mice, and have yet to be validated in different organisms.

Methods: We used two separate approaches. The first was pharmacological and three groups of rats had Ad Libitum access to a high-fat diet and received two daily injections. The Control group received two vehicle injections, one at 7am, and another at 7pm. One treated group was administered MTII at 7am, and vehicle at 7pm. The other treated group received vehicle at 7am, and MTII at 7pm. In the second approach, two groups of rats had access to a high-fat diet either 24 hours/day (Control), or 12 hours/day only during dark phase (TRF). Body weight, light/dark phase and total feeding were recorded daily for 22 days.

Results: In approach 1, daily and cumulative food intake were significantly lower in both MTII groups, compared to Control (P < 0.001); however, no difference was detected between MTII groups. As expected, timing of injection profoundly affected light/dark phase feeding patterns. Despite differences in feeding patterns, neither body weight nor fat mass differed between MTII am and pm. It can be concluded that feeding patterns do not influence MTII-induced body weight loss in rats. In approach 2, neither daily caloric consumption nor cumulative food intake were affected by TRF. Surprisingly, changes in fat mass and lean body mass were similar between Control and TRF groups. Thus, TRF may not protect against diet-induced obesity in rats.

Conclusions: Overall, the present data does not support a role of feeding schedule on energy homeostasis in rats. It appears that total caloric intake is the best predictor of weight loss in rats. Given that most humans participating in TRF naturally reduce their food intake, the anti-obesity effect of TRF in humans might be simply reflect the caloric reduction, and thus the effectiveness of TRF per se is questionable.
THE T090137-TREATED MOUSE: A QUICK AND COST-EFFECTIVE MODEL TO INVESTIGATE THE IMPACT OF HEPATIC STEATOSIS ON CYP450-MEDIATED METABOLISM

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Background and objectives: Non-alcoholic fatty liver disease (NAFLD) is a common disorder associated with obesity and type II diabetes. NAFLD patients often use numerous drugs to manage comorbidities. Little is known about the effects of NAFLD on drug disposition. A key player in drug metabolism is the CYP3A subfamily. To generate a rapid preclinical model of NAFLD, we characterized the impact of T0901317, a liver X-receptor agonist, on the development of NAFLD. The hepatic mRNA expression of four CYP3a isoenzymes and their functionality were evaluated.

Methods: Seven to nine-week old female C57BL/6 mice were injected intraperitoneally daily for 4 days with either vehicle or T0901317 (T0) 20 mg/kg (n=5/group). Livers were collected, washed, weighted and snap frozen in liquid nitrogen. Frozen optical cutting temperature-embedded liver sections were stained with Oil red O. Total RNA was isolated and relative mRNA levels of cyp3a11, cyp3a13, cyp3a25 and cyp3a44 were assessed by quantitative PCR (qPCR). Microsomes were also extracted, the protein content was determined and standard incubations were performed with testosterone, a probe CYP3A substrate.

Results: T0 treatment caused a 1.8-fold increase in total liver weight compared to vehicle treatment. A marked lipid infiltration was also observed in T0-treated mice, a hallmark of NAFLD. Hepatic mRNA levels of cyp3a11 and cyp3a25 were increased significantly by 2.1 and 1.6-fold, respectively, in T0-treated mice compared to vehicle-treated animals. In contrast, we observed significant 1.4 and 2.5-fold decreases in the hepatic mRNA levels of cyp3a13 and cyp3a44, respectively, compared to vehicle-treated mice. Interestingly enough, a significant decrease (4.5-fold) in CYP3A hepatic activity was observed in T0-treated compared to vehicle-treated mice.

Conclusions: With further characterization, the T0901317-treated mouse could represent a quick and cost-effective animal model for evaluating the effects of hepatic steatosis on drug metabolism, thus providing increased mechanistic understanding for potential therapeutic approaches.
SESSION 11 - Physical Activity/Exercise
85-HFAU-242

USE AND REPLICABILITY OF BILATERAL AND SIMULTANEOUS MULTI-ARTERIAL BLOOD PRESSURE MEASUREMENTS IN SEDENTARY AND PHYSICALLY ACTIVE PROFESSIONS

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Background and objectives: Lack of physical activity has become endemic in office life. Sedentary associated disorders include general adaptation syndrome ('stress'), musculoskeletal, cardiovascular, metabolic and overweight related diseases. These conditions provoke absenteeism and presenteeism, increasing economic and mental burden. Therefore, employers and employees alike are motivated to invest in corporate wellbeing. To evaluate life-style improvement at individual and group levels, validated sensitive non-invasive cardiovascular health assessments are key. We evaluated use and replicability of a novel multi-arterial blood pressure device in healthy sedentary and physically active, non-sedentary individuals in their professional environment.

Methods: Arterial properties of 20 asymptomatic (46.0(SD12.9) years, 6 sedentary and 14 non-sedentary volunteers, all working at the same company, were assessed twice, with initial and repeat observations at least one night apart. A Vascassist device and Vasometrix software (iSYMEd/Adiphea, Butzbach, Germany) was used. Ankle-brachial index (ABI) and pulse wave velocity (PWV) were calculated from bilaterally, simultaneously acquired brachial and ankle arterial pressures. Central Aortic Pressure (CAP) and Vascular Age (VA) were calculated from bilateral brachial and radial cuff data. Validated general transfer functions (GTF's) were used.

Results: Assessments were well tolerated. Overall, initial RR's were raised (134(SD15.6)/81(12.6) versus 124(10.6)/73(10.8)mmHg in repeats, r<0.001). Initial and repeat ABI's (1.20(SD0.08), 1.20(0.08)%), and PWV's (10.3(SD1.6), 10.2(1.4)m/s, r=0.85) were highly correlated. So were CAP's (116.3(9.4) and 115.5(9.4mmHg), and VA's (39.7(12.6) and 41.0(11.9) years). Subanalyses revealed sedentary subjects showed increased initial SBP's (Δ9.0mmHg, p=0.03), DBP's (Δ14.2mmHg, p<0.001), and VA's (Δ11.1yrs, p=0.04), but not in repeat assessments (all p's>0.1). ABI's in the active were consistently lower (1.17(0.05) versus 1.28(0.07)%: p's<0.001), as were diastolic CAP's (Δ's 14.3 and 12.5mmHg; p's<0.01). ΔPWV's were indifferent.

Conclusions: As in clinic, in corporate environments 'white coat' hypertension is observed. This is to be seriously accounted for as a general adaptation ('stress') autonomic response at group and individual levels, and is more outspoken in those sedentary. RR, ABI, PWV, CAP and VA proved highly replicable endpoints. In conclusion, simultaneous multiple arterial blood pressure assessments and validated GTF modelling can create robust functional and structural arterial endpoints for efficacy evaluation of pharmaceutical, nutriceutical and life-style interventions aimed at improvement of cardiovascular health.
EFFECTS OF PHYSICAL EXERCISE PROGRAM REMOTELY MONITORED ON OBESE WOMEN GRADES II AND III

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Background and objectives: Adherence to exercise programs in obese population is still very low due to emotional, physical, and financial factors. The objective of this study was to evaluate the effect of an exercise program monitored remotely on the health-related physical fitness of obese women grades II and III in relation to cardiorespiratory fitness, functional capacity, lower limb muscle strength, and trunk and hamstring muscle flexibility.

Methods: We evaluated obese women with body mass index (BMI) > 35 and <55 kg/m² and age between 20 and 59 years. The evaluation consisted of cardiorespiratory fitness and functional capacity measured by the six-minute step test (6MST), indirect lower limb strength in the sit to stand test, and trunk and hamstring muscle flexibility in the sit and reach test. All volunteers received general guidance on the benefits of exercise and specific instructions of the exercise protocols contained in the exercise booklet developed by the researchers and were divided into two groups. The remote monitoring exercise group (RMEG) consisted of 14 volunteers who received calls and phone messages of encouragement and motivation to do the training sessions during the week. At the end of each month, adjustments were made in relation to the number of sets and repetitions. The control group (CG) consisted of fourteen volunteers who received no contact during that period. The three-month training program consisted of aerobic and resistance exercises in one-hour sessions, three times a week. At the end of three months, both groups were reassessed.

Results: The RMEG showed a significant increase in the maximal oxygen uptake (VO₂max) (p=0.01), in the number of steps in the 6MST (p=0.01), in the number of sitting and standing movements (p=0.0001) and improved flexibility (p=0.0001). When groups were compared, the RMEG also achieved a significant increase in the in the VO₂ max (p=0.001), in the number of steps (p=0.001), the number of movements of sitting and standing (p=0.0006), and flexibility (p=0.007).

Conclusions: The remote monitoring exercise program had beneficial effects, with improvements on cardiorespiratory fitness, functional capacity, lower limb strength and flexibility in obese women grades II and III.
SESSION 11 - Physical Activity/Exercise
85-FHEB-132

EXERCISE AND METABOLOMICS: INVESTIGATING EXERCISE-INDUCED CHANGE IN METABOLITES AND ASSOCIATIONS WITH CARDIOMETABOLIC RISK FACTORS

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Background and objectives: Exercise-induced improvement in risk for chronic disease is attributed to changes in body composition, cardiorespiratory fitness, blood pressure and glucose metabolism; however, the underlying mechanism is unclear. Metabolomics offers the technology needed to investigate large numbers of metabolites that may participate in biochemical pathways of exercise-induced improvement in cardiometabolic risk. Our aim was to investigate the impact of an exercise intervention on plasma metabolites and whether changes in metabolite levels are related to changes in cardiometabolic risk factors.

Methods: A secondary analysis was performed in 216 middle-aged abdominally obese men and women (mean (SD), 52.4 (8.0) years) originally recruited to participate in a 6-month randomized controlled trial examining the effects of exercise amount and intensity on cardiometabolic risk factors. 139 metabolites were profiled by liquid chromatography-mass spectrometry. Cardiorespiratory fitness (CRF) was assessed using standard open-circuit spirometry during a maximal graded exercise test. Waist circumference (WC) was measured at the superior edge of the iliac crest. 2-hour glucose was measured in response to a 2-hour 75-g oral glucose tolerance test. Systolic (SBP) and diastolic blood pressure (DBP) was measured using an automated BP monitor.

Results: Seven metabolites significantly changed in the exercise compared to control group (p<0.05). There were no significant associations at the adjusted p-value (p<0.0004) between change in metabolites and change in 2-hour glucose, SBP or DBP. Change in leucine (B=-0.29), isoleucine (B=-0.30), UDP-N-acetylglucosamine (B=-0.40) and N-Acetyl-L-glutamic acid (B=0.27) were negatively associated and citric acid isocitric acid (B=0.29) was positively associated with change in CRF. Change in UDP-N-acetylglucosamine (B=0.46) was positively associated with change in WC (p<0.0004).

Conclusions: These findings represent a more global effort to uncover the biochemical pathways in which exercise elicits its cardiometabolic effects. These observations implicate several metabolites that may serve as biomarkers or have a direct regulatory role in pathways related to exercise and improved cardiometabolic status.
SESSION 11 - Physical Activity/Exercise  
85-UT8B-142

EFFECT OF EXERCISE TRAINING ON CARDIOVASCULAR RISK OF SEVERELY OBESE PATIENTS FOLLOWING BARIATRIC SURGERY

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Background and objectives: Severe obesity has been associated with several cardiovascular risk factors. Bariatric surgery has been shown to resolve/improve cardiovascular risk factors. The objective of the study was to evaluate the effects of a structured exercise training program on cardiovascular risk factors and more precisely on lipid profile following bariatric surgery.

Methods: A total of 113 severely obese patients (41.7±10.9 years, 47.1±5.9 kg/m², 75% women) who underwent bariatric surgery were included in this study. Patients included either underwent sleeve gastrectomy (n=24) or biliopancreatic diversion with duodenal switch surgery (n=89). Of these, 34 (30%) patients trained 3 times weekly, under the supervision of a kinesiologist, between month 3 and 6 after surgery and 79 (70%) patients had the usual care follow up regarding physical activity (control). All patients were evaluated before and at 6 and 12 months after bariatric surgery. At each visit, medical history including smoking status and diabetes, fasting blood samples assessing lipid profile and blood pressure were performed. The Framingham risk score (FRS) was calculated to assess the 10 years cardiovascular risk (%) of patients.

Results: Baseline characteristics of patients were similar between groups. At 12 months, there were no differences between groups (respectively training vs. control) for diabetes (80% vs. 78%, p=0.90), hypertension (80% vs. 74%, p=0.59) and dyslipidaemia resolution (75% vs. 86%, p=0.41). From baseline to 6 months after surgery, HDL change was significantly greater in the exercise training group vs. control group. From baseline to 6 months, both groups reduced significantly their FRS (training: 9.5±9.6% to 5.1±5.1%; respectively baseline to 6 months, control: 9.3±8.1% to 6.4±6.7%). There was no difference between groups (-4.4±5.9% vs. -2.5±6.0%; respectively training vs. control, p=0.17). From 6 to 12 months, the exercise training group slightly increased their FRS while the control group continue to decrease it (+0.1±3.1 vs. -1.3±2.4%; p=0.03). However, at 12 months after bariatric surgery, the FRS was similar (p=0.90) between training and control group (5.0±6.1% vs. 4.8±5.7%).

Conclusions: Our results suggest that a 3 months training program did not decrease further the FRS in patients who underwent bariatric surgery.
EFFECT OF BARIATRIC SURGERY AND EXERCISE TRAINING ON LIPID PROFILE OF SEVERELY OBESE PATIENTS

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Background and objectives: Bariatric surgery improves lipid profile, as well as physical capacity. However, the role and benefits of “add-on” exercise training after bariatric surgery on lipid profile are unknown. The objective of the study was to evaluate the effects of a structured training program on lipid profile following bariatric surgery.

Methods: A total of 60 severely obese patients [body mass index (BMI) ≥40 kg/m² or BMI ≥35 kg/m² with at least one comorbidity] who underwent bariatric surgery were included and randomised in the exercise training group (n=40) or in the control group (n=20). Patients randomized in the exercise group have trained one hour, 3 times weekly, under the supervision of a kinesiologist, between months 3 to 6 after surgery. All patients were evaluated before and at 3, 6 and 12 months after surgery. At each visit, fasting blood sample were performed including complete lipid profile. Patients who were on lipid lowering drugs had their LDL increased (adjusted LDL) according to the type and the dose of the statin and/or ezetimibe they were taking at each visit.

Results: A total of 52 patients (75% women, 41.4±11.6 years, 45.8±6.0 kg/m², 33% on lipid lowering drugs) were included for analysis. Baseline characteristics were similar between groups. At 3 months post-surgery, there was no difference between groups in weight loss (-18.1±3.4% vs. -18.3±4.2%; exercise vs. control, p=0.83) neither in lipid profile variables: apo-B, total cholesterol (chol), HDL, non-HDL, LDL, adjusted LDL, chol/HDL ratio and triglycerides (TG). Between 3 and 6 months, the exercise training group has greater increment in HDL compare to the control group (+0.18±0.14 mmol/L vs. +0.07±0.12 mmol/L, exercise vs. control, p=0.01), without difference between groups for the other lipid variables: apo-B (p=0.40), cholesterol (p=0.46), non-HDL (p=0.64), LDL (p=0.85), adjusted LDL (p=0.98), chol/HDL ratio (p=0.33) and TG (p=0.39).

Conclusions: Our preliminary results suggest a favourable additive effect of exercise training after bariatric surgery on HDL. More research is needed to better delineate the role of exercise after a bariatric surgery.
SESSION 11 - Physical Activity/Exercise
85-2VZ5-142

DAILY PHYSICAL ACTIVITY LEVEL IN PATIENTS WHO PARTICIPATED TO A SUPERVISED EXERCISE TRAINING PROGRAM FOLLOWING BARIATRIC SURGERY

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Background and objectives: Following bariatric surgery, it is generally believed that the practice of physical activity helps to maintain weight loss and has benefits on quality of life. However, the physical activity habits of these patients after the surgery are not known. Evidences and objectives measures of the physical activity level are sparse in the literature in this population. In this study, we measured the evolution of physical activity level in severely obese patients who underwent bariatric surgery.

Methods: Patients (n=60) were randomized in a supervised exercise training program group (n=40) or in the usual care group (n=20). Anthropometric measurements and daily physical activity using an accelerometer were performed before, at 3 and 6 months after bariatric surgery. Physical activity level was analyzed according to baseline steps per day: sedentary group (≤ 4999 steps/day) and active group (≥ 5000 steps/day).

Results: A total of 50 patients are included in this analysis. At baseline, there were no significant differences between groups regarding anthropometric measurements. The sedentary group was statistically older and, per design, had a lower level of daily steps and time spent at light and moderate-vigorous intensity physical activity level than the active group. At 3 months, there were no differences between groups for the time spent at light and moderate-vigorous intensity physical activity except for daily steps (5844±1760 vs. 3776±1645 steps; active vs. sedentary, p<0.0001). During the period 3rd to 6th month, each group independently increased their daily steps (sedentary; 1233±1800 steps, p<0.001) (active; 1613±3332 steps, p=0.034) and their practice of moderate-vigorous physical activity (sedentary; 8.8±21.4 min, p=0.039) (active; 17.9±35.4 min, p=0.028). These increments were similar between groups (p>0.05). Patients randomized in the supervised exercise group had no additive effect on their daily practice of physical activity.

Conclusions: Our data suggests that pre-surgery, physical activity level did not influence post-surgery practice of physical activity. The supervised exercise training program does not seem to play a major role in the patients’ physical activity behavior. Further research are needed to better understand daily physical activity practice after bariatric surgery.
DO PRIMARY CARE PHYSICIANS RESPECT THE GUIDELINES ON PHYSICAL ACTIVITY FOR TYPE 2 DIABETES PATIENTS? AN AUDIT AND FEEDBACK STUDY

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Background and objectives According to the Canadian Diabetes Association (CDA) clinical practice guidelines, physicians should be assessing and recommending physical activity for type 2 diabetes mellitus (T2DM) patients. Therefore, we sought to assess family physicians’ adherence to the CDA clinical practice guidelines with regards to physical activity for T2DM patients.

Methods: We conducted a retrospective audit and feedback study of all physicians and residents in a family medicine teaching unit (FMTU). We identified from electronic medical files patients aged between 50-69 years with glycated hemoglobin (HbA1c) of ≥6% between July 1st, 2015 and June 30th, 2016. We aimed to randomly select 42 files. Exclusion criteria were: HbA1c value assessed for reason other than office follow-up, absence of T2DM diagnosis and absolute contraindication for physical activity. We extracted the following information: patients’ characteristics, evaluation of patients’ physical activity status (active/sedentary) by physician (yes/no), physical activity counselling (yes/no) and referral to another professional (yes/no for nurse, exercise specialist and/or dietician). We used simple descriptive statistics.

Results: The mean age of the 39 included patients was 61 +/- 5.3 years and mean Hba1c was 7.6 +/- 1.2%. Half (44%) were engaged in some physical activity and one third (33%) were sedentary. Seventy-five percent were followed by physicians while the others (25%) were followed by family medicine residents. The CDA clinical practice guidelines on physical activity were divided into three recommendations for audit and feedback: 1) Evaluation of physical activity was respected at 77%; 2) Physical activity counselling was respected at 67%; 3) Referral to another professional was respected at 85%. Overall, the recommendations were completely respected in 23% of cases and at least one of the three was respected in 85% of cases.

Conclusions: Although limited by a small randomly selected sample in one FMTU, our results suggest adequate or acceptable adherence among family physicians to the CDA clinical practice guidelines with regards to physical activity for T2DM patients. However, as T2DM patients are managed by health providers from several disciplines, it is not clear if assessment of physicians alone is sufficient for improving patient outcomes.
FRIENDS MAKE CHILDREN LESS SEDENTARY AND NEIGHBOURHOODS MAKE THEM MORE ACTIVE

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Background and objectives: Sedentary behavior (SB) and physical inactivity are distinct constructs for which separate research and intervention paradigms should be considered. We compared individual- and neighbourhood-level risk factors for each behavior in a sample of youth at risk of obesity.

Methods: Data are from QUALITY, a cohort study of the natural history of pediatric obesity in Quebec, Canada. Baseline data were obtained in 2005-2008 when children were aged 8-10y (n=512 families). Activity level was measured using accelerometers at ages 8-10y and again 2 years later at ages 10-12y. Children were categorized as inactive if they did <60 min/day of moderate to vigorous physical activity and as excessively sedentary if they recorded <100 counts/min for >50% of the day. Child-level factors included sex, sleep duration, and frequency seeing friends; neighbourhood-level factors included density of fast food outlets, convenience stores, and parks; school proximity, street connectivity, land use mix, disorder, social and material deprivation, and parental perceived safety. Logistic regression models were estimated for inactivity and excessive SB, using the identical set of baseline risk factors, at both time points. Analyses were restricted to 413 and 283 children with complete data at ages 8-10y and 10-12y, respectively. Models controlled for child’s obesity status, parents’ obesity status, and parental education.

Results: At both time points, girls were almost twice as likely to be inactive than boys, but were equally likely to be excessively sedentary. At both time points, each additional weekly outing with friends reduced the likelihood of being sedentary by 20%, but did not reduce the likelihood of being inactive. Only disorder was associated with SB, and only in 10-12y olds; in contrast, factors increasing the likelihood of being inactive included deprivation at ages 8-10y (OR=1.7; 1.0-3.0) and perceived lack of safety at ages 10-12y (OR=2.8; 1.1-6.3). The likelihood of being inactive decreased by 24% for each quintile increase in land use mix.

Conclusions: Adopting distinct paradigms for physical inactivity and SB appears warranted. Reducing physical inactivity may be more effectively mediated by features of the built environment, while reducing SB may need to rely more on social and peer groups.
SESSION 12 - Population Health - Prevention
85-PHZN-311

EFFICACY OF SCHOOL POLICIES AND ENVIRONMENTAL INTERVENTIONS AIMED AT DECREASING SUGAR-SWEETENED BEVERAGES CONSUMPTION AMONG ADOLESCENTS: A SYSTEMATIC REVIEW

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Background and objectives: No previous reviews on sugar-sweetened beverages (SSBs) have specifically targeted adolescents in the school context. This systematic review assessed the efficacy of school-based interventions aimed at reducing SSBs consumption among adolescents. The results presented are concerning school policies and environmental interventions.

Methods: Adolescents had to be aged between 12 and 17 years. Only interventions carried-out in a school setting were included. SSBs encompassed non-diet soft drinks, fruit drinks, energy drinks, sports drinks, sweetened tea and coffee and other beverages with added sugar. Types of study designs included were randomised controlled trials, quasi-experimental studies and one-group pre-post studies. Articles had to be written in English or French. The following databases were investigated: MEDLINE/PubMed, PsycINFO, CINAHL, EMBASE and Proquest Dissertations and Theses. The search included articles published until December 1st, 2016. Two authors independently assessed articles for inclusion and extracted data using a standardised extraction form. The quality of studies was assessed using the Quality Assessment Tool for Quantitative Study of the Effective Public Health Practice Project.

Results: A total of 10 studies detailing 10 different school policies and environmental interventions tested among independent samples (n=71,049) were included. Nine studies were conducted in the United States and one was conducted in Canada. Seven studies were conducted among healthy adolescents and three studies targeted adolescents from low socioeconomic status. Six interventions adopted a one-group pre-post study design and four interventions used quasi-experimental designs. Concerning the quality of the studies, six studies received a moderate, three a weak and one a strong rating. Nine out of ten (90%) interventions significantly reduced SSBs consumption among adolescents. One intervention also saw an increase in percentage of adolescents consuming SSBs at post-intervention. One intervention observed no significant reduction in SSBs consumption at post-intervention.

Conclusions: School policies and environmental interventions show promising results to reduce SSBs consumption among adolescents and governmental efforts to reduce availability and/or eliminate SSBs in schools should be pursued. More studies targeting individuals and their environment are needed to avoid unintended consequences associated with interventions only aimed at changing the school food environment, such as adolescents buying SSBs outside of schools.
SESSION 12 - Population Health - Prevention
85-MW4U-92

THE BODY MASS INDEX AND ITS RELATIONSHIP WITH CARDIOVASCULAR RISK IN QUÉBEC MALE POLICE OFFICERS

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Background and objectives: Police tasks in emergency conditions impose high physiological and psychological demands, which can be particularly deleterious to the health and safety of police officers. According to the Officer Down Memorial Page, 8.5% of the deaths (n=131) that occurred among U.S. police officers in the last ten years while on duty were sudden cardiac deaths. Therefore it is essential for police officers to maintain a healthy body weight throughout their career in order to reduce the risk of on-duty death. Body mass index (BMI) is very likely associated to a higher cardiovascular disease (CVD) risk in male police officers. The aim of the study is to document CVD risk factors among Québec male police officers according to their BMI.

Methods: Two thousand ninety-nine (2099) male police officers (age: 40.8 ± 9.2 years; BMI: 27.7 ± 3.5 kg/m²) answered an online questionnaire evaluating the presence of CVD risk factors and symptoms. All data collected were self-reported. Three groups were formed based on the BMI; Group 1 (G1): 18.5 kg/m² ≤ BMI < 25 kg/m², Group 2 (G2): 25 kg/m² ≤ BMI < 30 kg/m², Group 3 (G3): BMI ≥ 30 kg/m².

Results: Presumed prevalence of obesity (BMI ≥ 30 kg/m²) is 21.1%. The number of modifiable risk factors (diabetes, hypertension, physical inactivity, smoking and dyslipidemia) is higher among participants with higher BMI before adjusting for age (G1: 1.05 ± 0.65, G2: 1.21 ± 0.77, G3: 1.63 ± 0.91, P≤0.001) and after (G1: 1.13 ± 0.65, G2: 1.21 ± 0.75, G3: 1.54 ± 0.87, P≤0.001). The BMI of participants who didn’t have any cardiovascular symptom (n=1114) was lower than that of participants who did report at least one cardiovascular symptom (n=793) before adjusting for age (27.05 ± 3.15 vs 27.71 ± 3.63, P≤0.001) and after (27.13 ± 2.99 vs 27.62 ± 3.42, P≤0.001).

Conclusions: These results show the important prevalence of obesity among Québec male police officers based on BMI. They also show the relationship between BMI and CVD risk factors and symptoms. These relationships suggest that the BMI is an important indicator of CVD risk in Québec male police officers.
SESSION 12 - Population Health - Prevention
85-WDCK-132

GENERIC CLOPIDOGREL POST-COMMERCIALIZATION SURVEILLANCE STUDY:
INCREASED RATES OF HOSPITALIZATIONS AND EMERGENCY ROOM CONSULTATIONS IN QUEBEC

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Background and objectives: Clopidogrel is used to prevent atherothrombotic events in cardiology. Federal standards regulate bioequivalence of generic and brand-name drugs through comparative bioavailability studies but does not regulate clinical equivalence nor tolerability in “real-life” settings. We evaluated the impact of the generic clopidogrel commercialization on emergency room consultations (ER) and hospitalizations.

Methods: A 2-year interrupted time series analysis was conducted using the Quebec Integrated Chronic Disease Surveillance System. Rates of adverse events for clopidogrel users (either brand-name or one of the 6 studied generics, n=75,130) aged ≥66 years were calculated monthly; 12 months before and 12 months after generics commercialization. Periods before and after generics commercialization were analysed by negative binomial segmented regression models with a specific variable for generic and brand-name users, compared by contrast tests.

Results: Generic clopidogrel analogs (n=6) were commercialized in 2012. Globally, there was an approximated monthly mean rate of 157 adverse events per 1000 brand-name and generic users-month. After generics commercialization, there was an immediate increase in rates of adverse events for generic vs. brand-name users (+21.7% vs. +2.2%, p<0.0001). This was explained by increased rates of ER (+21.6%) and hospitalizations (+20.0%) the month of generic clopidogrel commercialization (Figure 1). Rates of hospitalizations up to 1 year after generics commercialization were stable for generic users but reduced for brand-name users (-0.9% vs. -2.9%, p=0.01), while ER trends were comparable (-1.1% vs. -1.8%, p=0.2443).

Conclusions: Among generic clopidogrel users, increased rates of adverse events were observed soon after generics commercialization and up to one year following generic commercialization for hospitalizations. This justifies the need for further studies characterizing generic substitution as stricter generic licensing process may be required.
CAN THE AVAILABILITY OF ACTIVE PLAY EQUIPMENT IN SCHOOLS INFLUENCE CHILD ADIPOSITY?

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Background and objectives: Differences in the active play environments of elementary schools may influence child health. The purpose of the present study is to identify school typologies based on the availability of indoor and outdoor play equipment. We also examine associations between school play environments and child adiposity.

Methods: We studied 513 children attending 296 schools followed longitudinally in the context of the Quebec Adipose and Lifestyle Investigation in Youth study. The presence of 10 types of indoor (i.e., trampoline) and outdoor (i.e., jungle gym) school play equipment was assessed at baseline when students were between 8 and 10 years old. A trained nurse assessed child anthropometric measurements two years later.

Results: We used k-clusters analyses to identify school typologies that differed in the variety of the indoor and outdoor play equipment. We identified four distinct typologies. Multiple regression indicated that relative to children in schools with the least varied indoor play equipment (Type 1), children with the most varied indoor play equipment (Type 3) had lower overall body fat, \( B = -1.18 \), (95% CI, -2.21 to -1.14), \( P < .05 \) and smaller waist circumference \( B = -4.24 \) cm, (95% CI, -7.83cm to -0.65cm), \( P < .05 \). Associations were not significant when adiposity was described by BMI z-scores. All models were adjusted for hours of physical education, child sex, age, and amount of physical activity, as well as parental education, and household income.

Conclusions: Our results suggest there is considerable inequality in the quality of school play environments children are exposed to and that these variations predict adiposity. Quality of play environments were unrelated to BMI, suggesting that measures of central adiposity and body fat may better capture health outcomes.

Table 1. Regression coefficients depicting associations between cluster membership and later child adiposity outcomes

<table>
<thead>
<tr>
<th></th>
<th>Waist circumference (cm)</th>
<th>Fat Mass Index</th>
<th>BMI Z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>CI</td>
<td>B</td>
</tr>
<tr>
<td>Poor outdoor environment</td>
<td>-1.88</td>
<td>(-5.77,-2.00)</td>
<td>-0.73</td>
</tr>
<tr>
<td>Favorable indoor environment</td>
<td>-4.24</td>
<td>(-7.83,-0.65)*</td>
<td>-1.18</td>
</tr>
<tr>
<td>Favorable outdoor environment</td>
<td>-3.14</td>
<td>(-6.62,-0.35)</td>
<td>-0.95</td>
</tr>
<tr>
<td>Physical education</td>
<td>-0.01</td>
<td>(-0.06,-0.04)</td>
<td>0.01</td>
</tr>
<tr>
<td>MVPA (accelerometer)</td>
<td>-0.01</td>
<td>(-0.02,-0.003)**</td>
<td>-0.003</td>
</tr>
<tr>
<td>Sex (boy=1, girl=2)</td>
<td>-1.71</td>
<td>(-4.00,-0.58)</td>
<td>0.73</td>
</tr>
<tr>
<td>Age (months)</td>
<td>0.22</td>
<td>(0.12,0.32)***</td>
<td>0.02</td>
</tr>
<tr>
<td>Parent's education</td>
<td>-2.56</td>
<td>(-4.46,-0.66)**</td>
<td>-0.02</td>
</tr>
<tr>
<td>Household income (CND)</td>
<td>-0.04</td>
<td>(-0.10,-0.02)</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Notes. Asterisks denote significance: ** \( p < .01 \), *** \( p < .001 \). Cluster 1 (Poorest indoor play environment) is the reference group. Fat mass index (FMI) reflects (Total body fat mass (g)/100)/height(100)². MVPA= Moderate to vigorous physical activity. Parental education was scored as 1=high school, 2=pre-university level, 3= technical or trade school, or 4= university.
SESSION 12 - Population Health - Prevention
85-F9QT-242

USING GOOGLE STREET VIEW FOR MONITORING FEATURES IN THE BUILT ENVIRONMENT: FINDINGS FROM THE QUALITY NEIGHBOURHOOD STUDY

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Background and objectives: Features of the built environment may influence obesity by promoting or hindering active lifestyles and healthy eating. The recent widespread availability of geospatial services allows for innovative approaches to evaluate neighbourhood environments; however, their suitability for assessing and monitoring street-level features is unclear. Our objectives were to assess 1) the measurement properties of a desk-based audit instrument that uses Google Street View, by comparing desk-based and on-site assessments both conducted in 2015; and 2) our capacity to detect neighbourhood transformations, by comparing 2008 and 2015 audits.

Methods: Data come from QUALITY, a cohort study on the natural history of pediatric obesity in Quebec, Canada. Thirty residential neighbourhoods of QUALITY participants with up to 10 contiguous street segments (n=300 street segments total) were selected for both on-site and desk-based assessments. Audits were conducted in 2008 and in 2015, using the Virtual Audits of Neighbourhoods (VAN) Tool. We report agreement and compare features that were present and absent in 2008 and in 2015.

Results: Time required to complete audits was comparable for both methods. Agreement was moderate to high (Cohen's Kappa range: 0.614-0.946), with lower agreement for items requiring a more subjective assessment (e.g., sidewalk condition; general impression). At the street-segment level, six out of the 10 (60%) speed bumps, and 36/42 (86%) school crossings identified in 2015 were newly present (i.e. were absent in 2008). Several features present in 2008 were no longer present by 2015 including 37/58 (64%) 30-km speed limit signs, and 36/49 (73%) "watch our kids" signs. In 2008, 119 segments had no pedestrian-facilitating measures; only 4 of these (3%) had acquired any pedestrian-facilitating measure by 2015. We observed a decline in the presence of traffic-calming measures (48% fewer) and an improvement in the neighborhood food environment, with 67% and 31% fewer fast food restaurants and convenience stores present in 2015, respectively.

Conclusions: The VAN Tool is feasible, reliable and valid method to assess features of the built environment and is suitable to detect changes in the neighbourhood, including physical activity- and diet-related features. Applications for monitoring the obesogenic nature of neighbourhoods is warranted.
DO LIFESTYLE HABITS INFLUENCE THE DEVELOPMENT OF THE METABOLICALLY UNHEALTHY OBESE PHENOTYPE IN YOUTH?

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Background and objectives: It is unclear how lifestyle habits influence metabolically healthy obese (MHO) and metabolically unhealthy obese (MUO) phenotypes in youth. We sought to identify whether lifestyle habits at age 8-10 years predict the development of the MUO profile at age 10-12 years among previously obese but metabolically healthy children.

Methods: The QUALITY cohort comprises Caucasian youth (n = 630) with at least one obese biological parent, aged 8-10 years at baseline and followed-up two years later. We defined MHO as children with a BMI ≥ 97th percentile for age and sex and none of the following risk factors: triglycerides > 1.2 mmol/L, fasting glucose > 6.1, HDL-cholesterol < 1.04, or blood pressure > 95th percentile for age, sex, and height. MUO were defined as having a BMI ≥ 97th percentile for age and sex and at least one of these risk factors. Macronutrient intake was measured using three non-consecutive 24-hour diet recalls. Physical activity was measured using seven-day accelerometry. Sedentary behavior was measured using both accelerometry and self-reported screen time. Sleep duration was self-reported. Multivariable logistic regression models were used to examine how lifestyle behaviors at baseline predicted the development of the MUO profile two years later.

Results: At baseline, 64 participants were MHO; two years later, 25 of these became MUO and 39 remained MHO. Obese youth at baseline who engaged in greater screen time and ate fewer portions of fruits and vegetables tended to become MUO two years later. Every additional hour of screen time at baseline increased the likelihood of becoming MUO at follow-up by 63% (OR: 1.63, 95% CI 1.15, 2.32). In contrast, every additional serving of fruits and vegetables at baseline decreased the likelihood of becoming MUO at follow-up by 30% (OR: 0.70, 95% CI 0.51, 0.97).

Conclusions: Specific lifestyle habits, such as lowering screen time and increasing consumption of fruits and vegetables, may be important targets to prevent obese children from developing metabolic complications as they enter puberty.
VARIATIONS IN THE QUALITY OF FOOD ENVIRONMENTS ARE ASSOCIATED WITH ADIPOSITY IN PREADOLESCENTS ATTENDING CANADIAN URBAN SCHOOLS

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Background and objectives: Targeting obesogenic features of children’s environment that are amenable to change represents a promising strategy for health promotion. The school food environment, defined as the services and policies regarding nutrition and the availability of food in the school and surrounding neighborhood, is particularly important given that students travel through the school neighborhood almost daily and that they consume a substantial proportion of their calories at school.

Methods: As part of the Quebec Adipose and Lifestyle Investigation in Youth (QUALITY) cohort study, we assessed features of school indoor dietary environments and the surrounding school neighborhoods, when children were aged 8-10 years. School principals reported on food practices and policies within the schools. The density of convenience stores and fast food outlets surrounding the school was computed using a Geographical Information System. Indicators of school neighborhood disadvantage were derived from census data. Height, weight and body composition were measured in a clinical setting when participants were aged 10-12 years. We conducted cluster analyses to identify school food environment typologies. Associations between school types and adiposity were estimated in linear regression models.

Results: Cluster analysis identified three school typologies with distinct food environments. Schools were characterized as: overall healthful (45%); a healthful food environment in the surrounding neighborhood, but an unhealthful indoor food environment (22%); or overall unhealthful (33%). Less healthful schools were in more disadvantaged neighborhoods and were associated with greater central adiposity but not overall BMI.

Conclusions: Despite regulatory efforts to improve school food environments, there is substantial inequity in dietary environments across schools. Ensuring healthful indoor and outdoor food environments across schools should be included in comprehensive efforts to reduce obesity-related health disparities.
IMPLEMENTATION INTENTIONS INTERVENTION TO REDUCE THE SALT INTAKE AMONG HEART FAILURE PATIENTS: QUALITATIVE EVALUATION OF A PILOT STUDY

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2Laval University, Québec city, Canada

Background and objectives: Actions to reduce salt intake among patients with heart failure (HF) should be immediate. Literature reports that people who formulate or develop plans are more likely to act as intended, which can also be applied to health-related behaviours. The main objective of this study is to describe the action and coping plans developed by patients with HF who participated in experimental research that aimed at reducing the salt intake based on the Implementation Intentions Strategy.

Methods: The salt intake was evaluated by means of the self-report measures. A two-way instrument was used to elaborate the action and coping plans by the patients and their social referents (person who prepares the meals), with the help of the researcher when necessary. The plans analysis was based on the elaboration of six lists: one for the action plans, one for the anticipated obstacles and another for the coping planning, separated in the group individual and collaborative.

Results: Fifteen patients who prepare their own meal at home and 13 subjects with their social referent who prepares the food were included to study. The most frequent action plans were related to separating one teaspoon of salt per person per day into another container and to stop using ready-made industrialized spices. The most frequent anticipated obstacles were related to the bad taste of food and the more elaborate coping strategies were related to the patient support by the social referent and to the increasing the use of natural seasonings during the meals preparation.

Conclusions: Developing action plans, thinking about the obstacles that may arise during behaviour change, and developing coping strategies ensure the individual greater autonomy in their care, increasing the chances of an effective behavioural and lifestyle change.
SESSION 12 - Population Health - Prevention
85-59WW-152

IMPLEMENTATION INTENTION STRATEGIES TO REDUCE THE SALT INTAKE AMONG HEART FAILURE PATIENTS - PILOT RANDOMIZED CLINICAL TRIAL

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Background and objectives: The salt intake restriction is one of the priority behavioural changes in heart failure (HF) and the performance of specific interventions aimed at the modification of this behaviour is necessary. The aim of this study was to assess the potential effect of an implementation intentions intervention to lower salt intake among HF patients when delivered individually or collaboratively.

Methods: A pilot randomized clinical trial that included patients with HF and their social referent (person who was responsible to prepare the patient’s meals). The main end-point was the salt intake measured by self-reported methods. As secondary end-points, the psychosocial variables: intention and self-efficacy (referring to the use of up to one teaspoon of salt / day) and habit (referring to the use of more than one teaspoon of salt / day). Four groups were established: Individual and Collaborative Intervention and Individual and Collaborative Control. The variables of interest were obtained in the initial approach(T0) and after two months of follow-up(T3).

Results: The sample was consisted of 56 subjects, mostly elderly, with low educational level and low socioeconomic status. Most of patients (71.4%) had hypertensive etiology of HF and 78.6% were in functional class I. In 51.8% of the households, the person in charge of preparing meals was the patient. The patients submitted to the interventions had a significant reduction in salt intake, the total salt decreased from 11.8(±5.9) g/day in T0 to 4.9(±1.4)g/day per person in T3 (average). There was no change in salt intake in the control groups or when comparing the application of data collection instruments between the collaborative and the individual groups. For psychosocial variables, there was a reduction in the mean of the habit score in intervention group. For the intention variable, there was an increase in the mean of the score in the intervention group and all study subjects started the study with high mean.

Conclusions: The results of this pilot randomized clinical trial indicate the success of the implementation intention intervention on the reduction of salt intake among HF patients.