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5TH ICCR
CONGRESS

Chronic Societal
Cardiometabolic
Diseases

Abstract Book

Québec City, Québec, Canada
JULY 8-12, 2015



This activity is jointly provided by:

5th ICCR Congress on Chronic Societal Cardiometabolic Diseases



PHARMACOTHERAPY AND WEIGHT CONTROL

Why, what and when?

17:15–18:45 Wednesday 8 July 2015
Room 200A, Québec City Convention Centre

Chaired by Jean-Pierre Després, this interactive symposium will explore the relation between body fat, cardiometabolic risk and disease as well as discuss the impact of weight control interventions, both behavioural and pharmacological, on body weight, fat distribution and risk factors such as hypertension and dyslipidemia.

Welcome and introduction

Jean-Pierre Després, *Laval University*

Impact of weight loss on cardiometabolic risk

Paul Poirier, *Laval University*

Tailored approaches to weight control.

Is all weight loss the same?

Luc Van Gaal, *Antwerp University Hospital*

Pharmacotherapy, weight loss and fat depots

Lawrence Leiter, *University of Toronto*

Integrating weight control into the overall management of cardiometabolic risk

All faculty

Learning objectives

Upon completion of this activity, participants should be able to:

- Consider presence of other conditions when implementing weight management strategies
- Implement strategies to counter weight regain and promote long-term weight control

Target audience

Healthcare practitioners with a special interest in weight loss management

The Institute for Medical and Nursing Education, Inc. (IMNE) is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

IMNE designates this live activity for a maximum of 1.5 *AMA PRA Category 1 Credits™*.

Physicians should claim only the credit commensurate with the extent of their participation in the activity.

This CME-accredited symposium is supported by an educational grant from Novo Nordisk A/S

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Welcome Letter

Dear Colleagues,

We would like to welcome you to the 5th Edition of the International Chair on Cardiometabolic Risk (ICCR) Congress, which is now entitled “**ICCR Congress on Chronic Societal Cardiometabolic Diseases**”. This conference is jointly organised by the ICCR and the Réseau de recherche en santé cardiométabolique, diabète et obésité (CMDO) (Cardiometabolic Health, Diabetes and Obesity Network). The ICCR is a multidisciplinary academic organisation based at the Centre de recherche de l'Institut universitaire de cardiologie et de pneumologie de Québec which is affiliated with the Faculty of Medicine of Université Laval located in Québec City, Canada. The CMDO is a large network of investigators covering all pillars of health research relevant to chronic cardiometabolic diseases. This unique network is funded by the Fonds de la recherche du Québec - Santé (FRQ-S).

As a consequence of our poor nutritional habits and sedentary lifestyle, we have experienced a rapid growth in the worldwide prevalence of type 2 diabetes, which is largely a “lifestyle” disease. Most patients with type 2 diabetes are sedentary and characterised by a dangerous form of overweight/obesity: abdominal obesity. It is now well known that abdominal obesity increases the risk of developing a plethora of complications such as an atherogenic dyslipidemia, insulin resistance, features of the so-called metabolic syndrome, hypertension, type 2 diabetes, cardiovascular disease, sleep apnea and some forms of cancers, to only list a few of the well-documented disorders. Unfortunately, it has become evident that the worldwide epidemic of abdominal obesity cannot be handled by the current medical model in which these complications are most often managed by downstream and costly medical procedures/therapies. Furthermore, these complications are often evaluated and managed in isolation without the help of the proper multidisciplinary resources to improve patients' nutritional and physical activity/exercise habits.

There is clearly a need to take a fresh look at this societal disease and to explore not only how to better assess and manage the risk of abdominal obesity, but also how to work upstream at both individual and public health levels to combat this epidemic of abdominal obesity, metabolic syndrome and type 2 diabetes as these conditions remain key drivers of cardiovascular disease.

The 5th Edition of this congress will build upon the success of the four previous meetings held in Hong Kong, Buenos Aires, Québec City and Seoul. With more than 60 countries involved, the conference has an international flavour and truly fills a need in this area. Over a short period of 5 years, this new congress has rapidly become the international platform to discuss novel approaches and share scientific and clinical data to benefit healthcare professionals, clinicians and scientists in the fight against a lifestyle epidemic of sedentary behaviours and low quality nutritional habits leading to chronic societal diseases.

As the ICCR is based at the Centre de recherche de l'Institut universitaire de cardiologie et de pneumologie de Québec and at the Faculty of Medicine of Université Laval, we are particularly proud to welcome you to beautiful Québec City, for this exciting scientific event. The meeting will take place during our famous Summer Festival with numerous activities and exciting outdoor concerts.

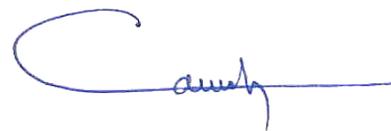
Please enjoy the meeting and the comfortable and relaxed atmosphere of having a conference in the summertime in beautiful Québec City!

Sincerely yours,

On behalf of the 5th ICCR Congress Program Committee



Jean-Pierre Després, Ph.D., FAHA, FIAS



Jean-Claude Coubard

About the International Chair on Cardiometabolic Risk



The International Chair on Cardiometabolic Risk is an independent, academic, multidisciplinary organisation affiliated with Université Laval and located at Centre de recherche de l'Institut universitaire de cardiologie et de pneumologie de Québec in Québec City, Canada. It is composed of two councils: an Executive Council and a Scientific Council.

The members of both councils have been chosen based on their expertise, their remarkable scientific contributions and their status as world leaders in their discipline. The makeup of both councils exemplifies the multidisciplinary nature of the Chair, with all members active in complementary areas of expertise. The Chair provides a forum for them to share their knowledge and expertise regarding diverse pathophysiological conditions eventually leading to cardiovascular disease.

A key aspect of the Chair is its international and multidisciplinary character, with the following disciplines represented: cardiology, diabetology, lipidology, endocrinology and metabolism, obesity, nutrition, physical activity and basic research.

The Chair organises and participates in an array of activities at international medical congresses while reaching out to both scientific and lay communities. The Chair's website, which was launched in the fall 2007, is a key component of its mission. The website is the most comprehensive, up-to-date and easy-to-use source of information on abdominal obesity and cardiometabolic risk. Intended for both health professionals and the general public, it uses state-of-the-art technology to help visitors better understand the risk factors and markers that must be addressed and the lifestyle changes that must be made in order to prevent abdominal obesity, type 2 diabetes and cardiovascular disease.

The Chair's website is highly interactive and features free slides, webcasts, and videos in which world-renowned experts discuss themes relevant to abdominal obesity and cardiometabolic risk. The Chair also publishes the **CMR^eJournal**, which is available through its website. The e-journal complements the Chair's website and provides up-to-date information on abdominal obesity and related cardiometabolic risk for a range of audiences. Also available on the website is a downloadable iPad application which allows physicians and health professionals to access their patients' cardiometabolic risk through a comprehensive set of algorithms. Moreover, algorithms are included to access level of physical activity and nutritional quality, two key correlates of cardiometabolic health.

By providing a platform for integrated research, developing physician and patient education programs and working to create new prevention and treatment strategies, the Chair is committed to stopping and reversing the abdominal obesity pandemic for the benefit of patients and society alike.

Our website can be found at: www.myhealthywaist.org

Oral Presentations

Session 1:

85-EWyD-293

BREAST ADIPOCYTE HYPERTROPHY IS ASSOCIATED WITH A HIGH WAIST CIRCUMFERENCE INDEPENDENT OF BODY MASS INDEX IN WOMEN WITH BREAST CANCER*Sofia Laforest¹, Francine Durocher², André Tchernof¹, Caroline Diorio²*¹Quebec Heart and Lung Institute²CHU de Québec Research Center

Objective: Dysfunctional adipose tissue has been proposed as a potential mechanistic mediator of the well-known relationship between obesity and breast cancer (BC). Associations between the level of adiposity and adipocyte size are well documented in the abdominal fat compartments but less data are available regarding breast adipocytes. We aimed to investigate variation of mammary adipocyte cell size as a function of common anthropometric measurements such as the body mass index (BMI), waist circumference (WC) and waist-to-hip ratio (WHR). We tested the hypothesis that breast fat cell size is more closely associated with anthropometric variables reflecting abdominal fat distribution (WC and WHR) than overall adiposity (BMI).

Methods: Mammary adipose tissue was obtained during partial or total mastectomy in a sample of 163 women with unilateral BC diagnosed after a mammography exam (age 30 to 69 years). The sample included 85 pre- or perimenopausal women and 78 postmenopausal women. Participants had not received chemotherapy, radiotherapy or hormone therapy before surgery. Hematoxylin and eosin-stained slides of whole adipose tissue located at least 1 cm distal to the tumor margins were used to measure cell diameter of 250 adipocytes per patient. Mean adipocyte diameter of each patient was used in the analyses.

Results: Breast adipocyte diameter was 78.8 μm (range 40.4-117.3 μm). Median BMI was 26.0 kg/m^2 (range 17.2-48.6), median WC was 86 cm (range 64-135) and median WHR was 0.81 (range 0.68-0.95). Menopausal status and age were associated with breast adipocyte diameter ($r=0.40$ and 0.41 , $p<0.0001$ for both). Breast adipocyte diameter was associated with BMI ($r=0.61$), WC ($r=0.72$) and WHR ($r=0.65$) ($p<0.0001$ for all). These associations remained similar after adjustment for age and menopausal status. WC and WHR were still associated with breast adipocyte diameter after adjustment for BMI, age and menopausal status ($r=0.45$, $r=0.39$, $p<0.0001$ for both). BMI was not associated with breast adipocyte diameter after adjustment for WC, age and menopausal status.

Conclusion: Anthropometric measurements reflecting central obesity such as WC and WHR are associated with breast adipocyte hypertrophy independent of BMI, age and menopausal status in women with BC undergoing surgery.

Session 1:

85-6Jww-273

SEVEN-DAY CALORIC AND SATURATED FAT RESTRICTION INCREASES MYOCARDIAL DIETARY FATTY ACID PARTITIONING IN IMPAIRED GLUCOSE-TOLERANT SUBJECTS

*Christophe Noll¹, Margaret Kunach¹, Frédérique Frisch¹, Lucie Bouffard¹, Stéphanie Dubreuil¹,
Farah Jean-Denis¹, Serge Phoenix¹, Brigitte Guérin¹, Eric Turcotte¹, André Carpentier¹*

¹Université de Sherbrooke

Objectives: Subjects with impaired glucose tolerance (IGT) have increased myocardial partitioning of dietary fatty acids (DFA) with left ventricular dysfunction that are improved by modest weight loss over one year induced by lifestyle changes. The aim of the present study is to determine the effects of a 7-days hypocaloric diet (-500 kcal/d) low in saturated fat (<7% of energy) (LOWCAL study) vs. isocaloric with usual saturated fat (~10% of energy) diet (ISOCAL) on DFA metabolism in IGT subjects.

Methods: Organ-specific DFA partitioning and cardiac and hepatic DFA fractional uptake rates were measured in 15 IGT subjects (7M/8F) using the oral 18-Fluoro-6-thia-heptadecanoic acid positron emission tomography method ([¹⁸F]-FTHA) after 7 days of ISOCAL vs. LOWCAL diet using a randomized crossover design.

Results: LOWCAL led to reduction in weight (-0.9 ± 0.3 kg, P < 0.002) and reduction in postprandial insulin AUC (-19.1 ± 6.4 %, P < 0.02). We found a significant increase in myocardial DFA partitioning over 6 hours after LOWCAL vs. ISOCAL (2.3 ± 0.1 vs. 1.9 ± 0.2 SUV, P < 0.04). However, early (90 to 120 min) myocardial DFA fractional uptake was unchanged after LOWCAL (0.055 ± 0.025 vs. 0.046 ± 0.009 min⁻¹, P = 0.7). Liver DFA partitioning (3.8 ± 0.3 vs. 4.0 ± 0.3 SUV, P = 0.68) was unchanged, but liver fractional uptake of DFA tended to be increased (0.052 ± 0.008 vs. 0.035 ± 0.008 min⁻¹, P < 0.09). We found a strong negative correlation between change in myocardial DFA partitioning and change in monounsaturated fatty acid/polyunsaturated fatty acid (ρ=-0.515, P < 0.06), change in dietary fibres intake (ρ=-0.713, P < 0.005) or change in leptin level (ρ=-0.579, P < 0.03).

Conclusions: Restriction of caloric and saturated fat dietary intake does not explain the normalization of organ-specific DFA metabolism associated with weight loss in IGT. Cardiac DFA metabolism changes rapidly during acute dietary modifications, but the pathophysiological significance of this early adaptation remains to be determined.

Session 1:

85-bNS7-144

THE SEPARATE EFFECTS OF EXERCISE AMOUNT AND INTENSITY ON ABDOMINAL ADIPOSITY IN OBESE ADULTS*Theresa Cowan¹, Paula Stotz¹, Robert Ross¹**¹Queen's University*

Objectives: The purpose of this study was to determine the separate effects of exercise amount (kcal/session) and intensity (% of VO_{2peak}) on abdominal adipose tissue in obese adults.

Methods: Of 300 abdominally obese adults in an exercise intervention, MRI data was obtained on 127 participants at baseline and 24 wks. These participants were randomized into one of 4 groups: Control (no exercise, n=23 (13 females, 10 males)), low amount, low intensity (LALI) (180 kcal/session for females and 300 kcal/session for males at 50% VO_{2peak} , n=33 (19 females, 14 males)) high amount, low intensity (HALI) (360 kcal/session for females and 600 kcal/session for males at 50% VO_{2peak} , n=41 (27 females, 14 males)), or high amount, high intensity (HAHI) (360 kcal/session for females and 600 kcal/session for males at 75% VO_{2peak} n=30 (19 females, 11 males)). Participants performed supervised exercise 5 times/wk for 24 wks. Abdominal adipose tissue (AT), visceral adipose tissue (VAT), and subcutaneous adipose tissue (SAT) were determined from a single image obtained at the level of L4-L5.

Results: Baseline abdominal AT, VAT, and SAT were not different between groups. At 24 weeks total abdominal AT, VAT, and SAT were reduced in all exercise groups ($p < 0.05$) but not control ($p > 0.05$). After controlling for age, gender, and baseline values HALI and HAHI had reductions in total AT and VAT compared to control (Total abdominal AT: HALI -66.7 ± 66.2 cm³ $p=0.009$; HAHI -77.3 ± 71.4 cm³ $p=0.004$), (VAT: HALI -36.8 ± 5.0 cm³ $p=0.011$; HAHI -33.9 ± 5.8 cm³ $p=0.048$). LALI showed a trend towards a reduction in VAT compared to control (VAT: -32.7 ± 36.9 cm³ $p=0.053$) but not a reduction in total abdominal AT compared to control (total abdominal AT: -49.0 ± 92.5 cm³ $p=0.27$). For SAT, only HAHI had reductions compared to control (-46.6 ± 42.7 cm³ $p=0.025$).

Conclusion: At a fixed intensity, reductions in total abdominal AT, but not VAT, were greater with increasing amount of exercise. At fixed amounts of exercise, increasing intensity was associated with an increased mobilization of SAT but did not influence the observed reduction in total abdominal AT or VAT.

Session 2:

85-79xV-243

ROLE OF GENETIC FACTORS IN EXPLAINING THE CLUSTERING OF ABDOMINAL OBESITY, INFLAMMATION AND CARDIOMETABOLIC RISK FACTORS IN THE QUEBEC FAMILY STUDY (QFS)*Louis Pérusse¹, Angelo Tremblay¹, Jean-Pierre Després², Claude Bouchard³**¹Department of kinesiology, Laval University**²Institut universitaire de cardiologie et de pneumologie de Québec**³Human Genomics Laboratory, Pennington Biomedical Research Center*

Objectives: Despite evidence that the cardiometabolic risk factors defining the metabolic syndrome (MetS) are heritable, relatively little is known about the contribution of genetic factors in explaining the clustering of abdominal obesity, inflammation and MetS-related traits. We performed a bivariate genetic analysis to test the hypothesis that there is a shared genetic basis (genetic pleiotropy) between abdominal obesity, inflammation and MetS-related traits.

Methods: Waist circumference (WC), visceral adipose tissue (VAT) assessed by CT-scan, inflammatory markers (CRP, IL6 and adiponectin) and the MetS components based on the NCEP-ATP III definition were assessed in a maximum of 902 QFS subjects (395 men, 507 women). Bivariate genetic analyses were performed to determine genetic and environmental correlations between age- and sex-adjusted pairs of traits using the SOLAR software.

Results: The MetS ($h^2 = 0.43$) and its components ($0.35 \leq h^2 \leq 0.56$), visceral adipose tissue (VAT; $h^2 = 0.44$) and inflammatory markers ($0.22 \leq h^2 \leq 0.70$) are heritable ($p \leq 0.0005$) in QFS. Significant genetic (ρ_G) and environmental (ρ_E) correlations were observed between VAT and CRP (ρ_G/ρ_E : 0.59/0.48), IL6 (0.67/0.28) adiponectin (-0.41/-0.28), and fasting levels of glucose (0.56/0.48), insulin (0.76/0.48), triglycerides (0.29/0.50) and HDL-cholesterol (-0.27/-0.50). The same trend was observed when using WC as indicator of abdominal obesity with significant ρ_G and ρ_E values for CRP (0.64/0.46), IL6 (0.74/0.39), adiponectin (-0.39/-0.39), glucose (0.43/0.39), insulin (0.76/0.46), triglycerides (0.36/0.49) and HDL-cholesterol (-0.31/-0.46).

Conclusions: Our results suggest that the clustering of abdominal obesity, inflammation and cardiometabolic risk factors defining the MetS are explained by both common genetic and environmental factors. The presence of a shared genetic basis between abdominal obesity and cardiometabolic risk factors suggests that, in addition to be influenced by unique genetic factors, each set of traits are influenced, to some extent, by the same genes. These results suggest that there are pleiotropic genes linking abdominal obesity, inflammation and cardiometabolic risk.

Session 2:

85-cpEv-233

MODULATION OF C-REACTIVE PROTEIN AND PLASMA OMEGA-6 FATTY ACID LEVELS BY PHOSPHOLIPASE A2 GENE POLYMORPHISMS FOLLOWING AN OMEGA-3 SUPPLEMENTATION*Bénédicte L. Tremblay¹, Iwona Rudkowska¹, Patrick Couture², Simone Lemieux¹, Pierre Julien², Marie-Claude Vohl¹**¹Institute of Nutrition and Functional Foods (INAF), Laval University**²CHU de Québec Research Center, Endocrinology and Nephrology*

Objectives: 1- To study the inter-relationship between changes in omega-6 fatty acids (Δ n-6) in phospholipids (PL) and changes in plasma CRP levels (Δ CRP) in men and women in response to an omega-3 fatty acids (n-3 FA) supplementation, and 2- to test whether single nucleotide polymorphisms (SNPs) in PLA2G4A and PLA2G6 genes are associated with plasma n-6 FA in PL and plasma CRP levels before and after the supplementation.

Methods: A total of 210 subjects completed a 2-week run-in period followed by a 6-week supplementation with 5g of fish oil (1.9-2.2g eicosapentaenoic acid and 1.1g docosahexaenoic acid). Plasma CRP levels were measured and the FA composition of plasma PL was analyzed by chromatography in plasma pre- and post-n-3 FA supplementation. A total of 191 subjects were considered in statistical analyses after exclusion of subjects with plasma CRP levels ≥ 10 mg/l. Genotyping of 27 SNPs of the PLA2G4A and PLA2G6 genes was performed. Pearson correlations were used to test the inter-relationship between Δ 916; CRP and Δ 916; n-6 FA levels. A repeated MIXED procedure was used to test for the effects of the genotype, the supplementation, and the genotype by supplementation interaction on n-6 FA and CRP levels.

Results: n-3 FA supplementation decreased n-6 FA in plasma PL without affecting plasma CRP levels. Analyses were performed separately for men and women. Δ CRP correlated positively with Δ n-6 FA in men ($r=0.25$ $p=0.01$) but not in women. Interaction effects between SNPs and n-3 FA supplementation modulate n-6 FA in plasma PL and CRP levels in both men and women. Associations between SNPs and n-6 FA levels and between SNPs and CRP levels were identified, for men and women, independently of n-3 FA supplementation. Moreover, rs10157410f in PLA2G4A explained 13.08% of variance in Δ CRP levels in men.

Conclusion: The levels of n-6 FA in plasma PL and plasma CRP levels are modulated by SNPs within PLA2G4A and PLA2G6 genes alone or in interaction with n-3 FA supplementation.

Session 2:

85-ToaP-293

 ω -3 PUFA TREATMENT PREVENTS CARDIAC DYSFUNCTION AND IMPROVES GLUCOSE TOLERANCE IN STATIN-TREATED OBESE DYSLIPIDEMIC MICE*Patricia Mitchell¹, Dominic Lachance¹, André Marette²*¹CRIUCPQ²Faculté de Médecine, Université Laval

Objectives: ω -3 PUFAs are recommended for primary prevention of type 2 diabetes (T2D) and CVD even though the evidence is inconclusive. Long chain ω -3 PUFAs have been shown to be substrates for lipid mediators playing a role in inflammation resolution. We have shown endogenous biosynthesis of ω -3 PUFA-derived resolution mediators is associated with improved resolution capacity and improved glucose tolerance. The aim was to determine if statin and dietary ω -3 PUFAs together improve CVD in association with reduced glucose intolerance, and if this is linked with increased synthesis of resolution mediators.

Methods: LDL^r mice were fed a high-fat (55% of calories), high sucrose diet (22% of calories) (HFHS) supplemented or not with 2.5 % fish oil (HFHS+FO) for 12 wk to induce obesity and glucose intolerance. The HFHS feeding continued for an additional 8 wk during which time mice received a daily dose of atorvastatin (10 mg/kg BW) or vehicle. Blood sampling, echocardiography and OGTT were performed before and after statin treatment.

Results: The HFHS diet induced obesity was unaffected by FO supplementation or statin treatment. Echocardiograms showed a reduction in left ventricular ejection fraction and fractional shortening in HFHS mice compared to chow-fed controls, and was reversed by FO. As expected, atorvastatin treatment lowered plasma cholesterol in the HFHS and HFHS+FO groups compared to vehicle-treated animals. The lipid lowering effects of the statin were associated with prevention of HFHS-induced impairment in cardiac function. Neither atorvastatin nor FO improves glucose homeostasis in HFHS fed mice (fasting glucose and HOMA-IR index). However, we observed that statin treatment exacerbated glucose intolerance in these obese animals, which was significantly attenuated by FO. Further analysis will determine if FO-derived lipid mediators played a role in attenuating the adverse effect of statins on glucose tolerance.

Conclusions: In conclusion, both dietary FO and statin therapy protect from obesity-induced cardiac dysfunction. Our results suggest that combining statin therapy with ω -3 PUFAs may prevent drug-induced glucose intolerance, which is of clinical significance given recent evidence that statin therapy, despite its cardiovascular benefits, may confer increased risk for T2D in some patients.

Poster Presentations

Session 1: Abdominal Obesity/Body Fat Distribution

85-1MY6-293

SAGITTAL ABDOMINAL DIAMETER AS A SURROGATE MARKER OF INSULIN RESISTANCE IN CHILDHOOD - BRAZILIAN METABOLIC SYNDROME STUDY (BRAMS)

Cleliani de Cassia da Silva¹, Ana Carolina Junqueira Vasques², Mariana Porto Zambon³, Daniella Fernandes Camilo¹, Ana Maria De Bernardi Rodrigues¹, Maria Ângela Reis de Góes Monteiro An³, Bruno Geloneze⁴

¹State University of Campinas (UNICAMP)

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³Department of Pediatrics, State University of Campinas, Campinas, São Paulo, Brazil

⁴Laboratory of Investigation in Metabolism and Diabetes-Gastrocentro-State University of Campinas

Objectives: The sagittal abdominal diameter (SAD) is a surrogate indicator of visceral fat, suggesting to be a marker of insulin resistance (IR). Studies with adults have demonstrated significant associations between SAD and IR, but its performance to predict IR determined by hyperglycemic clamp in adolescents has not been determined. The aim of this study was to investigate the performance of SAD in identifying IR in adolescents.

Methods: This is a cross-sectional multicenter study carried out with 559 adolescents (321 girls; 10-19.9 years old; Tanner stages II-V). A subsample from the whole group of 72 adolescents (37 girls) underwent the hyperglycemic clamp. SAD was measured at the umbilicus level, in the supine position with knees slightly bent, using the Holtain-Kahn Abdominal Caliper. Body composition was measured using tetrapolar bioimpedance. IR was evaluated using the HOMA-IR and glucose infusion rate adjusted for free fat mass (GIR_{FFM}) obtained in the clamp. In total sample and in the subsample, adolescents were considered with increased SAD if they were ≥ 75 th percentile (≥ 20.4 and ≥ 22.0 cm), respectively; and considered with IR if they were ≥ 75 th percentile of HOMA-IR (≥ 3.39) and if they were ≤ 25 th percentile for GIR_{FFM} (≤ 0.11). Statistical analysis: partial correlation coefficient, logistic regression and ROC analysis. Analyses were performed after adjustment for age, gender, pubertal stage and BMI z-score.

Results: SAD showed significant correlations with IR measured by clamp ($r = -0.63$) and by HOMA-IR ($r = 0.53$); $p < 0.001$. These results remained significant after adjusting for age, gender, pubertal stage and BMI z-score (clamp: $r = -0.25$ and HOMA-IR: $r = 0.25$); $p < 0.05$. SAD also exhibited good performance in identifying IR (clamp AUC: 0.861 [95%CI, 0.759-0.931]; and HOMA-IR AUC: 0.810 [95%CI, 0.775-0.842]); $p < 0.001$. Furthermore, the SAD demonstrated significant odds ratio (OR) for the development of IR (clamp B [SE]: 2.16 [0.97]; OR: 8.7 [1.3-57.4], $p = 0.02$; R^2 : 0.49; and HOMA-IR B [SE]: 1.21 [0.31]; OR: 3.4 [1.8-6.2], $p < 0.001$; R^2 : 0.33).

Conclusions: SAD showed to be a surrogate marker of IR in Brazilian adolescents. Subsequent studies should be conducted in search of cut-off points to enable its application in clinical practice.

Session 1: Abdominal Obesity/Body Fat Distribution

85-nM53-293

IMPACT OF ABDOMINAL OBESITY ON ANTHROPOMETRIC, PHYSICAL AND HEMODYNAMIC PARAMETERS ACCORDING TO SEX IN ADOLESCENTS BEGINNING A MULTIDISCIPLINARY INTERVENTION PROGRAM

Nelson Nardo Junior¹, Anselmo Alexandre Mendes¹, Rafaela Pilegi Dada¹, Ronano Pereira Oliveira¹, Danilo Fernandes da Silva¹, Adriano Ruy Matsuo¹, Jane Maria Remor¹, Josiane Aparecida Alves Bianchin¹, Caroline Ferraz Simoes¹, Caio Machado de Oliveira Terr¹, Victor Hugo de Souza Mendes¹, Marciele Alves Bolognese¹, Veridiana Mota Moreira¹, Luiz Delmar da Costa Lima¹, Natália Carlone Baldino Garcia¹

¹State University of Maringá

Objective: Evaluate the impact of abdominal obesity on physical parameters according to sex in adolescents beginning a multidisciplinary intervention.

Methods: Two hundred and eighty adolescents aged between 10 and 18 years were allocated in with abdominal obesity (n=125; 45 girls) and without abdominal obesity (n=155; 91 girls), according to the cut-off points established by Fernandez et al. (2004). The measures were made in the baseline for the beginning of the 16-week multidisciplinary program for obesity treatment (PMTO) focused on changing exercise and eating behaviors based on cognitive behavioral therapy. Briefly, this program counts with physical educators, nutritionists, a psychologist and a pediatrician and has three sessions of intervention per week with one hour of group intervention with each professional involved more one hour of physical exercise training each session. Anthropometric measures, body composition, blood pressure, flexibility, abdominal strength/resistance, and VO_{2max} were evaluated based on standardized procedures. We used Shapiro-Wilk test for assessing normality according to sex and the presence of abdominal obesity. Based on that, data were presented as median (range) and non-parametric Mann-Whitney test was used to compare adolescents with and without abdominal obesity in both sexes. Significance was set at P<0.05.

Results:

Table 1. Impact of abdominal obesity on anthropometric, physical and hemodynamic parameters according to sex in adolescents beginning a

Variables	Male Adolescents		P	Female Adolescents		P
	With abdominal obesity (n=80)	Without abdominal obesity (n=45)		With abdominal obesity (n=64)	Without abdominal obesity (n=91)	
Age (years)	13 (10-18)	13 (10-17)	0.938	12 (11-18)	15 (10-18)	<0.001
Body weight (kg)	92.4 (55.1-134.2)	76.8 (47.6-102.7)	<0.001	81.2 (55.6-124.8)	73.5 (45.5-106.3)	0.002
BMI (kg/m ²)	32.6 (24.1-50.8)	26.9 (21.9-32.5)	<0.001	32.4 (23.1-43.9)	27.7 (21.6-38.4)	<0.001
Abdominal (rep)	18 (0-44)	25.5 (7-42)	<0.001	15 (0-32)	21 (1-42)	<0.001
Flexibility (cm)	18 (1.5-32.5)	21 (0-36.5)	0.040	25 (0-55)	27 (1-47)	0.108
VO _{2max} (mL/kg/min)	24.7 (18-43.7)	29.5 (20-47.1)	0.001	22 (18-53.1)	28 (18-51.9)	<0.001
Body fat (%)	44.0 (30.6-58.4)	35.8 (20-54.5)	<0.001	46.8 (35.5-57.4)	42.3 (27.2-52.3)	<0.001
Lean mass (kg)	46.8 (29.6-73.6)	45.9 (22.2-69.4)	0.264	41.1 (30.1-56.4)	40.1 (25.9-57.3)	0.912
SBP (mm/Hg)	123 (90-200)	119 (95-174)	0.075	119.5 (85-152)	117 (94-149)	0.082
DBP (mm/Hg)	73 (55-102)	67.5 (54-89)	<0.001	73 (47-126)	72 (56-91)	0.105

Data presented as median (range). *P<0.05. BMI = Body Mass Index; VO_{2max} = maximal oxygen uptake; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure.

Data presented as median (range). *P<0.05. BMI = Body Mass Index; VO_{2max} = maximal oxygen uptake; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure.

Conclusions: Adolescents without abdominal obesity presented greater results for anthropometric parameters, percentage body fat, abdominal strength/resistance, and VO_{2max} in both sexes. For boys, adolescents with abdominal obesity also presented lower flexibility as well as higher diastolic blood pressure. Girls with abdominal obesity were younger than girls without it. Thus, abdominal obesity negatively affected anthropometric, physical and hemodynamic parameters.

Session 1: Abdominal Obesity/Body Fat Distribution

85-RPX7-293

FEMALE HEALTHCARE PROFESSIONAL WITH ABDOMINAL OBESITY SHOWED LOWER ADIPONECTIN CONCENTRATIONS*Fernanda Vidigal¹, Júlia Carraro², Larissa Chaves², Josefina Bressan²**¹Faculty of Nutrition, Universidade Federal de Alfenas, Brazil**²Department of Nutrition and Health, Universidade Federal de Viçosa, Brazil*

Objectives: To check for differences in plasma concentrations of inflammatory biomarkers in female healthcare professional with and without abdominal obesity.

Methods: It was a cross-sectional observational study that integrates a multicenter study LATIN America METabolic Syndrome (LATINMETS). The study sample consisted of 168 female healthcare professional (20-59 years). It was measured weight, height and waist circumference. The body mass index (BMI) was calculated. Women with waist circumference equal or greater than 80 cm were considered as having abdominal obesity (Alberti et al., 2009). The inflammatory biomarkers assessed were adiponectin, interleukin-1 β (IL-1 β), interleukin-6 (IL-6), interleukin-10 (IL-10) and tumor necrosis factor- α (TNF- α). Statistical analysis consisted of the Mann-Whitney and Spearman's correlation. The significance level (α) adopted for all hypothesis tests was 5%. Statistical analysis was performed with SPSS for Windows (version 17.0, SPSS Inc, Chicago, IL).

Results: Of the 168 female healthcare professional included in the study, 64.3% were from the nutrition field, 14.3% of physical education, 7.1% of nursing, 5.4% of physiotherapy and 4.2% of medicine, with a median age of 26 years. Analyzing nutritional status by BMI, 21.2 % of the women were overweight (BMI \geq 24.9 kg/m²). The inflammatory biomarkers IL-1 β , IL-6, IL-10 and TNF- α were not correlated with waist circumference ($p > 0.05$), whereas the adiponectin was inversely correlated ($r = -0.202$; $p < 0.01$). There was no statistical difference between the concentrations of IL-1 β , IL-6, IL-10 and TNF- α among women with and without abdominal obesity. Nevertheless, female healthcare professional with abdominal obesity showed lower concentrations of adiponectin [12.8 (9.1-19.0) μ g/mL; $p < 0.05$] compared with those without abdominal obesity [16.2 (12.8-20.1) μ g/mL; $p < 0.05$].

Conclusions: Female healthcare professional with abdominal obesity had lower concentrations of adiponectin, a cytokine with anti-inflammatory properties, suggesting the negative impact of obesity and the presence of adiposopathy.

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Session 1: Abdominal Obesity/Body Fat Distribution

85-uyYP-124

DIFFERENCES IN ABDOMINAL AND LIVER FAT ACCUMULATION BETWEEN OBESITY-MATCHED DIABETIC AND NON-DIABETIC ADULTS

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Objectives: The prevalence of obesity and Type 2 Diabetes (T2D) is already high and increasing. Although 75% of Canadian adults with T2D are obese, only 15% of obese adults have T2D. Though attempts have been made to identify the mechanisms by which obesity leads to the development of T2D, it remains unclear why some but not all obese adults develop T2D. Given the established associations between visceral adipose tissue (VAT) and liver fat with insulin resistance, we hypothesized that in comparison to age and obesity matched non-diabetics, T2Ds would have greater amounts of both VAT and liver fat.

Methods: The International Study of Prediction of Intra-abdominal Adiposity and Its Relationship with Cardiometabolic Risk/Intra-abdominal Adiposity aims to study the associations between VAT and liver fat and the risk of developing T2D and cardiovascular disease. Of the 4504 participants, complete data sets were available for 2982 participants. T2D (N=1032) and non-diabetic (N=1950) men and women were matched for age, body mass index and waist circumference. VAT and liver fat were measured using computed tomography.

Results: In women, T2Ds had significantly greater levels of VAT (150.61 + 53.58 cm² vs. 135.81 + 54.38 cm²) and liver fat (50.96 + 12.85 HU vs. 57.27 + 9.87 HU) compared to non-diabetics, p<0.05. Similar results were observed in men, where T2Ds had significantly more VAT (188.12 + 88.30 cm² vs. 172.69 + 72.83 cm²) and liver fat (50.24 + 12.23 HU vs. 54.54 + 10.81 HU) compared to non-diabetics, p<0.05. Further analysis revealed by removing impaired fasting glucose/impaired glucose tolerant participants from the non-diabetic group, a greater difference in VAT was observed in T2D women (149.31cm² vs. 125.37cm²) and men (180.79cm² vs. 161.17cm²) compared to non-diabetics, p<0.05. The difference in liver fat between T2Ds and non-diabetics for both men and men was significant, however, the magnitude of this difference was similar to that observed in the initial analysis.

Conclusions: The results support a significant relationship between VAT and liver fat and T2Ds in our sample and highlight VAT and liver fat as depots that are at least partially responsible for the differences between T2Ds and non-diabetics.

Session 1: Adipose Tissue

85-EiHL-273

LIPID METABOLISM AND STORAGE IN ADIPOCYTES STUDIED VIA METABOLIC NETWORKS LINKED TO THE DEVELOPMENT OF TYPE TWO DIABETES*Thierry Chénard¹, André Carpentier¹, André Tchernof², Rafael Najmanovich¹**¹Université de Sherbrooke**²Université Laval*

Objectives: Use a systematic bioinformatics analysis of adipocyte metabolism to identify genes affecting adipose tissue expansion mechanisms (adipocyte hypertrophy and hyperplasia)

Methods: We analysed a human adipocyte metabolic network and two tissue specific networks for subcutaneous and omental adipose tissues, based on the published iAdipocytes1809 network and additional gene expression data and manual curation, using in-silico gene deletion. These in-silico gene deletion, realised using flux balance analysis, permitted the prediction of the gene deletions on the optimal production of lipid droplets and of biomass used as representation of hypertrophy and hyperplasia of adipocytes respectively.

Results: Of all the genes present in the metabolic network, less than thirty genes were predicted as having a larger effect on lipid droplet production than on biomass production in at least one model, which we consider as an indication that the genes deletion or the resulting proteins inhibition could reduce fatty acid absorption and therefore reduce hypertrophy in adipocytes. Some of the identified genes, such as LPL and LCAT, have experimental evidence corresponding to our predicted effect on adipocytes, while others such as PCYT2 and CEPT1, could serve as new potential targets in remodelling of adipocytes and type two diabetes treatment if their effect is experimentally validated.

Conclusion: By the use of a metabolic network, multiple genes were predicted as having the potential to reduce hypertrophy in adipocytes. Those results can guide new in-cellulo and ex-vivo studies to validate the therapeutic targets in the treatment of type two diabetes.

Session 1: Adipose Tissue

85-d1md-124

ROLE OF TGF- β SIGNALING IN CELLULAR MATRIX REMODELING OF ADIPOCYTES UNDERGOING DEDIFFERENTIATION*Andre Tchernof¹, Julie Anne Côté¹, Marc Lapointe¹**¹Quebec Institute of Cardiology and Pulmonology - Laval University*

Introduction: Organ fibrosis is associated with secretion of inflammatory mediators including TGF- β and excess deposition of extracellular matrix components such collagen. This remodeling process also seems to be implicated in adipocyte dedifferentiation.

Objective: To study the role of TGF- β signaling in the process of mature adipocyte dedifferentiation and determine its association with remodeling and the collagens involved.

Methods: Subcutaneous (SC) and omental (OM) adipose tissue samples were obtained from patients undergoing bariatric surgery. They were digested with collagenase and cell suspensions were cultivated in ceiling cultures using DMEM/F12 supplemented with 20% serum. Adipocytes were also dedifferentiated and incubated with DMEM/F12 supplemented with 5% serum, 5% serum + TGF- β (5 ng/mL) or 20% serum. TGF- β 1, TGF- β 2, TGF- β 3, Col1a1, Col1a2 and Col6a3 gene expression was measured using qRT-PCR in whole SC and OM adipose tissue samples, in the stroma-vascular fraction (SVF) and in dedifferentiated fat cells. Protein expression of TGF- β 1 was confirmed by Western Blot and Oil red O staining was performed on dedifferentiated cell cultures.

Results: TGF- β 1, Col1a1 and Col6a3 gene expression was significantly higher in dedifferentiated cells compared to whole adipose tissue samples ($p=0.05$, $p=0.02$ and $p=0.03$, respectively) in both depots. TGF- β 1, TGF- β 3 and Col1a1 gene expression was significantly higher in dedifferentiated cells compared to SVF cells ($p=0.02$, $p=0.01$ and $p=0.02$, respectively) in both depots. TGF- β 1, Col1a1 and Col6a3 gene expression was significantly higher at day 12 of the dedifferentiation process compared to day 0 ($p=0.01$, $p=0.02$ and $p=0.02$, respectively) in both depots. Protein expression of TGF- β 1 increased from day 0 to day 12 of the dedifferentiation process in both depots. When cultivated in ceiling cultures without serum, adipocytes could not adhere to the top surface of the flask and did not dedifferentiate. ORO pictures showed no lipid droplets in serum starved cells compared to 20% serum supplemented cells. The presence of 5% serum (vs 20% serum) after the dedifferentiation process resulted in the same levels of expression for TGF- β 1, TGF- β 2, TGF- β 3, Col1a1, Col1a2 and Col6a3. In contrast, supplementation of TGF- β (5 ng/mL) with 5% serum increased TGF- β 1, TGF- β 2, Col1a1 and Col6a3 gene expression significantly (vs 5% or 20% serum alone, $p<0.05$ for all).

Conclusion: TGF- β and collagens are implicated in the dedifferentiation process of mature adipocytes and TGF- β supplementation can increase expression of various genes which are modulated during this process.

Session 1: Adipose Tissue

85-NmZS-274

IN-VITRO CHARACTERIZATION OF THE THERMOGENIC PROPERTIES OF HUMAN EPICARDIAL ADIPOCYTES

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Objectives: We, and others, have previously reported that human epicardial adipose tissue (eAT) expresses UCP1 and other genes related to thermogenesis. However, whether the presence of UCP1 mRNA can be translated into thermogenic activity by human epicardial adipocytes remains unknown. In the current study, we sought to characterize the thermogenic capacity, and regulation of the thermogenic activity, of human epicardial adipocytes using an in-vitro approach.

Methods: Paired biopsies of eAT, mediastinal adipose tissue (mAT) and subcutaneous adipose tissue (sAT) were obtained from 9 patients undergoing heart surgeries at QHLI. Biopsies were subjected to collagenase digestion and primary cell culture. Cells were then pooled and differentiated in-vitro followed by qPCR and oxygen consumption rate (OCR) analyses using XF^e bioanalyzer.

Results: In-vitro differentiated epicardial adipocytes exhibited significantly higher expression of UCP1 mRNA relative to mediastinal and subcutaneous adipocytes. In addition, most genes related to thermogenesis and beta-oxidation were upregulated in the epicardial adipocytes. OCR analysis further indicated that epicardial adipocytes possessed a higher spare respiratory capacity relative to mediastinal and subcutaneous adipocytes. Acute stimulation with a cAMP analog resulted in an upregulation of thermogenic machinery at the mRNA level, as well as in the leak respiration, in all three adipocyte subtypes. In addition, all three adipocyte subtypes responded to fibroblast growth factor-21 and atrial natriuretic peptide treatment with an upregulation of oxygen consumption rates.

Conclusions: We demonstrate that in-vitro differentiated epicardial adipocytes exhibit higher thermogenic-capacity and -activity relative to the mediastinal and subcutaneous adipocytes in humans. However, all three adipocyte subtypes namely epicardial, mediastinal and subcutaneous can upregulate their thermogenic-capacity and -activity upon stimulation.

Session 1: Cardiometabolic Risk

85-UL1i-283

CARDIOMETABOLIC RISK FACTORS ASSOCIATED WITH SUBCLINICAL ATHEROSCLEROSIS IN APPARENTLY HEALTHY YOUNG ADULTS*Stéphanie LeBlanc¹, Karine Bibeau¹, Jean-Pierre Després¹, Éric Larose¹**¹Institut universitaire de cardiologie et de pneumologie de Québec*

Objectives: We sought to determine whether and to what degree atherosclerosis is present in apparently healthy young adults devoid of traditional cardiovascular risk factors and obesity, and we investigated the associations of cardiometabolic risk markers with early atherosclerosis burden in this population.

Methods: Young Caucasian adults (18-36 years) devoid of traditional cardiovascular risk factors and obesity, and no history of chronic medication use or disease were assessed for cardiometabolic risk markers. Subcutaneous abdominal adipose tissue (SAT), ectopic fat depots (visceral abdominal adipose tissue [VAT], epicardial adipose tissue [EAT], and hepatic fat fraction [HFF]), as well as carotid artery wall volumes (CAWV) were measured by magnetic resonance imaging.

Results: According to cardiometabolic profile, the 240 participants (25.8 ± 4.5 years; 48% women) had a low-risk for atherosclerosis. However, premature atherosclerosis was present in 68.8% of the population with no difference between prevalence in both sexes although the burden was significantly greater in men vs. women (CAWV: 1817 ± 330 vs. 1579 ± 228 mm³/48mm, $p < 0.0001$). Men possessed lesser SAT volume than women, while they presented higher EAT and VAT volumes compared to women. HFF was similar between men and women. CAWV increased progressively with the accumulation of VAT and EAT. Early atherosclerosis was associated with apolipoprotein B/apolipoprotein A-1 ratio, fasting blood glucose, waist circumference and EAT volume, but waist circumference was the strongest marker independently associated with atherosclerosis burden. In addition, "high-normal" levels of risk factors commonly used (≥ 50 th percentile), especially when clustering, are associated with greater atherosclerosis burden in this population.

Conclusion: Subclinical atherosclerosis is present in more than half of all apparently healthy young adults despite the absence of traditional cardiovascular risk factors and obesity. Waist circumference is the strongest predictor of atherosclerosis burden in both males and females of our cohort. Our findings suggest routine waist circumference measurement may help identify risk of premature atherosclerosis in apparently healthy young men and women in the absence of traditional risk factors.

Session 1: Cardiometabolic Risk

85-QRQL-104

LIFESTYLE MATTERS! HOW LIFESTYLE VARIABLES PREDICT BIOLOGICAL CARDIOVASCULAR DISEASE RISK FACTORS AT THE WORKPLACE*Valérie Lévesque¹, Paul Poirier¹, Jean-Pierre Després¹, Natalie Alméras¹**¹Quebec Heart and Lung Institute, Research*

Objectives: Despite the key role played by lifestyle habits in the epidemic proportions reached by obesity and cardiovascular diseases (CVD), nutritional quality and physical activity levels are not often considered in most health evaluations. The aim of the present study was to validate the relevance of using a simple lifestyle risk score to predict biological CVD risk factors in a health evaluation program designed for the workplace.

Methods: A cardiometabolic risk profile was assessed in 3313 employees (2367 men and 946 women) from six different companies through the "Grand Défi Entreprise" (Grand Corporate Challenge) project. The evaluation included questionnaires on medical history and lifestyle habits (including nutritional quality and physical activity level), hemodynamic and anthropometric measurements, waist circumference (WC), lipid profile and cardiorespiratory fitness. In order to assess the impact of WC and fitness as well as behaviors (nutritional quality and physical activity) on the cardiometabolic risk, we generated a lifestyle risk score which allowed us to categorize employees into three distinct estimated risk levels (low, intermediate and high). We then generated a biological risk score combining total cholesterol, HDL-C, triglycerides, Cholesterol/HDL-C, systolic and diastolic BP and the presence of diagnosed type 2 diabetes (7-point scale).

Results: BMI, diastolic BP, triglyceride levels and Cholesterol/HDL-C ratio increased across categories of lifestyle risk score, while HDL-C decreased ($p < 0.05$). The Framingham risk score, the diabetes risk score, the prevalence of hypertriglyceridemic waist phenotype as well as the difference between vascular age and biological age also increased across categories of lifestyle risk, both in men and women ($p < 0.05$). Systolic BP increased across the three categories of lifestyle risk in women, while only the high-risk category showed a higher value in men. Correlation analyses revealed that the lifestyle risk score was significantly associated with the biological risk score ($R = 0.35$, $p < 0.0001$).

Conclusions: Results of our study suggest that assessing key lifestyle features through a simple lifestyle risk score at the workplace may represent a relevant approach to predict biological CVD risk variables and to identify individuals at high risk for CVD.

Session 1: Cardiometabolic Risk

85-rrPH-124

IMPACT OF A 1-YEAR CARDIAC REHABILITATION PROGRAM ON THE CARDIOMETABOLIC RISK OF POST-CORONARY BYPASS GRAFT PATIENTS

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Objectives: Cardiac rehabilitation is a recognized nonpharmacological modality in the management of coronary artery disease (CAD) to improve cardiovascular health as well as to reduce morbidity and mortality. The aim of the study was to test the relevance of a one-year lifestyle modification program designed to be implemented in a clinical setting on the cardiometabolic risk (CMR) profile of patients with severe CAD. The impact of the intervention on the glucose tolerance status and the left ventricular morphology was also studied.

Methods: Eighty-six post coronary bypass patients were integrated in a one-year lifestyle modification program. Anthropometric measurements, assessment of the lipid profile, magnetic resonance imaging of the heart and abdomen, an oral glucose tolerance test (OGTT) and a maximal treadmill test were performed before and after the 1-year intervention.

Results: In response to the 1-year lifestyle modification program, patients significantly reduced their waist circumference ($\Delta=-2.5\pm 5.2$ cm) and their abdominal visceral ($\Delta=-8.3\%$) and subcutaneous ($\Delta=-8.5\%$) as well as intrathoracic epicardial ($\Delta=-16.6\%$) and pericardial ($\Delta=-29.5\%$) adipose tissue volumes ($p<0.05$). Significant reductions in triglyceride levels ($\Delta=-0.18\pm 0.51$ mmol/l), apolipoprotein B ($\Delta=-0.02\pm 0.10$ mmol/l) and cholesterol/HDL-C ratio ($\Delta=-0.33\pm 0.54$) were observed, while HDL-C ($\Delta=+0.14\pm 0.23$ mmol/l) and apolipoprotein A1 ($\Delta=+0.08\pm 0.16$ mmol/l) increased ($p<0.01$). Absolute maximal oxygen consumption (L/min) improved by more than 12% after the intervention ($p<0.0001$). Furthermore, resting heart rate decreased by 4 bpm and normalized left ventricular end-diastolic volume increased ($\Delta=3.8\pm 10.9$ ml/m²) ($p<0.01$). No significant change in left ventricular mass was observed. Accordingly, left ventricular concentricity index was significantly reduced ($\Delta=-0.03\pm 0.13$) ($p<0.05$). Finally, patients with glucose intolerance (Fasting glucose 6.1-7.0 mmol/l or 2h-plasma glucose 7.8-11.1 mmol/l) ($n=36$) significantly reduced their 2h plasma glucose and insulin levels as well as their glucose and insulin areas under the curve measured during the OGTT ($p<0.05$). Moreover, 50% of them normalized their glucose tolerance after the 1-year lifestyle intervention.

Conclusion: These findings support the relevance of a lifestyle modification program in addition to the traditional pharmacological modality for an optimal management of patients with severe CAD who underwent coronary artery bypass graft surgery.

Session 1: Cardiovascular Disease

85-nbpw-243

CARDIAC STRUCTURAL AND FUNCTIONAL CHARACTERISTICS IN SEVERELY OBESE (BODY MASS INDEX 50 KG/M2) PATIENTS BEFORE BARIATRIC SURGERY

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Introduction: Very severely obesity, defined as a body mass index (BMI) ≥ 50.0 kg/m², is associated with increased surgical complications and general mortality. The aim of this study was to assess the echocardiographic characteristics of very severely obese patients prior bariatric surgery.

Methods: Retrospective analysis of preoperative echocardiograms of severely obese patients who underwent bariatric surgery at the Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirón in Mexico City. Structural characteristics included atrial dimension, end-diastolic interventricular septal thickness (IVSd), left ventricle mass (LVM), and LVM indexed (LVMI). Functional characteristics included diastolic and systolic function. The degree of obesity (below and above BMI ≥ 50 kg/m²) was correlated with cardiac parameters and comorbidities.

Results: Data on 312 patients (75.3% woman, mean age 39.3 \pm 0.6 years, mean BMI 50.2 \pm 0.47 kg/m², 46% with BMI ≥ 50 kg/m²) was analyzed. Prevalence of type 2 diabetes (T2DM) and dyslipidemia (DLD) was similar in patients with BMI <50 and ≥ 50 kg/m², whereas hypertension (HTN) (61% vs. 77%, p=0.001), and pulmonary arterial hypertension (PAH) (55% vs. 81%, p<0.001) were higher in the BMI ≥ 50 kg/m² group. Heart parameters are shown in Table 1. After adjusting for age, T2DM, HTN, and PAH, presence of LV hypertrophy was independently associated with BMI ≥ 50 kg/m².

Conclusion: In this cohort of middle-aged severely obese adults, we found differences in cardiac structure and function in patients with BMI ≥ 50 kg/m². This degree of obesity predicted LV hypertrophy, but not T2DM and HTN.

Table 1. Myocardial characteristics according to BMI < or ≥ 50 kg/m²

Characteristics	BMI < 50 (n=169)	BMI ≥ 50 (n=143)	p
Left Atrium, mm	39.6 (4.8)	41.9 (5.2)	<0.001
LVEDD, mm	45.1 (5.2)	47.8 (5.7)	<0.001
IVSd, mm	10.4 (1.6)	11.2 (1.9)	<0.001
PWd, mm	10.1 (1.5)	10.7 (1.9)	0.002
LVM, g	161.3 (46.2)	194.1 (55.6)	<0.001
LVMI, (g/ht ^{2.7})	43.6 (12.3)	51.8 (15)	<0.001
Fractional Shortening, %	38.1 (6.8)	35.1 (7.4)	0.001
Ejection Fraction, %	62.8 (5.0)	60.8 (7.1)	0.002
SPAP, mmHg	43.7 (10.1)	50.5 (11.3)	<0.001
IVRT, cm/s	74.9 (12.6)	83.9 (15.2)	<0.001

LVEDD: left ventricular end-diastolic diameter, PWd: posterior wall thickness in diastole, SPAP: systolic pulmonary pressure, IVRT: isovolumetric relaxation time

Session 1: Cardiovascular Disease

85-tEwD-84

DON'T JUST SIT THERE - IMPACT OF PROLONGED SITTING ON VASCULAR HEALTH IN CHILDREN

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Importance: Excessive sedentary behavior has serious clinical and public health implications; however, the physiological changes that accompany prolonged sitting in the child are not completely understood.

Objectives: To examine the acute effect a prolonged period of sitting has upon superficial femoral artery function in children and the impact of interrupting prolonged sitting with exercise breaks.

Design: Randomized crossover experiment.

Setting: Pediatric Inactivity Physiology Laboratory (Sept 2014- Feb 2015), Centre for Heart, Lung and Vascular Health, University of British Columbia, Okanagan.

Participants: Nine girls (7-10 years).

Main Exposure: All participants completed two conditions: a 3-hour uninterrupted period of sitting (SIT) and a 3-hour period of sitting interrupted each hour with 10 minutes of moderate intensity exercise (EX).

Main Outcome Measures: Superficial femoral artery endothelium-dependent flow-mediated dilation, total shear rate, antegrade and retrograde shear rates and oscillatory shear index, before and after the SIT and EX conditions. A mixed-model analysis of variance was used to compare between condition and within condition main effects, controlling for the within-subject nature of the experiment by including random effects for participant.

Results: Superficial femoral artery endothelium-dependent flow-mediated dilation decreased significantly from pre- to post-SIT (mean difference 2.2% flow-mediated dilation; 95% CI = 3.15-3.67%, $P < 0.001$). This relative decline of 33% was abolished in the EX intervention. Shear rates were not significantly different between or within conditions ($P > 0.05$).

Conclusion and Relevance: Our data demonstrate that three hours of uninterrupted sitting in girls is detrimental to vascular health; 10-minute exercise breaks each hour prevented these adverse declines in vascular function. These data highlight the importance of not just sitting there, but taking regular exercise breaks.

Session 1: Cardiovascular Disease

85-8R8n-174

OXIDIZED PHOSPHOLIPIDS, LIPOPROTEIN(A) AND PROGRESSION OF CALCIFIC AORTIC VALVE STENOSIS

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Background: Elevated lipoprotein(a) [Lp(a)] is associated with calcific aortic valve stenosis (CAVS). Oxidized phospholipids (OxPL) are key mediators of calcification in valvular cells and are carried by Lp(a). It is not known if Lp(a) and OxPL predict progression of CAVS, a clinically-relevant endpoint that predict aortic valve replacement (AVR). The objective of this study was to determine whether Lp(a) and OxPL are associated with hemodynamic progression of CAVS and CAVS-related events.

Methods: OxPL on apolipoprotein B-100 (OxPL-apoB), which reflects the biological activity of Lp(a), and Lp(a) levels were measured in 220 patients with mild-to-moderate CAVS enrolled in the ASTRONOMER Trial. The primary endpoint was the progression rate of CAVS, measured by the annualized increase in peak aortic jet velocity (V_{peak}) in meters/second/year (m/s/yr) by Doppler-echocardiography, and secondary endpoint need for AVR and cardiac death during 3.5 ± 1.2 years of follow-up.

Results: CAVS progression was faster in patients in the top tertiles of Lp(a) (V_{peak} : $+0.26 \pm 0.26$ vs. $+0.17 \pm 0.21$ m/s/yr, $p=0.005$) and OxPL-apoB ($+0.26 \pm 0.26$ vs. $+0.17 \pm 0.21$ m/s/yr, $p=0.01$). After multivariable adjustment, elevated Lp(a) or OxPL-apoB levels remained independent predictors of faster CAVS progression (both $p \leq 0.03$). After adjustment for age, gender and baseline CAVS severity, patients in the top tertile of Lp(a) or OxPL-apoB had increased risk of AVR and cardiac death (Hazard Ratio [HR]: 2.0, 95% confidence interval [CI] 1.1-3.7, $p=0.02$; HR: 1.9, 95% CI 1.0-3.4, $p=0.04$; respectively).

Conclusion: Elevated Lp(a) and OxPL-apoB levels are associated with faster CAVS progression rate and need for AVR. These findings support the hypothesis that Lp(a) mediates CAVS progression through its associated OxPL and provide a rationale for randomized trials of Lp(a) and OxPL-apoB lowering therapies in CAVS.

Session 1: Diabetes

85-eGvY-243

KEY THEORETICAL BELIEFS FOR INTERVENTIONS AIMED AT PROMOTING HEALTHY EATING AND PHYSICAL ACTIVITY AMONG WOMEN WITH PRIOR GESTATIONAL DIABETES MELLITUS

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Objective: The aim was to identify beliefs that interventions should target to promote healthy eating and regular physical activity (PA) among women with prior gestational diabetes mellitus (GDM) in order to lower risks of developing type 2 diabetes.

Methods: A total of 127 and 83 women with prior GDM completed self-administered questionnaires based on the Theory of Planned Behavior assessing beliefs on healthy eating and PA, respectively. Both questionnaires contained 18 items, all measured on 5-point Likert-type scales. Diet was assessed using a validated interviewer-administered food-frequency questionnaire and PA was measured using the International Physical Activity Questionnaire. Key beliefs were identified using stepwise discriminant analyses with a selection for entry set at a partial R^2 of 0.01. Healthy eating was defined as a diet that follows Canada's Food Guide's recommendations for all four food groups.

Results: Women's mean age was 36.5 ± 4.8 years, 66.7% had a mean family annual income \geq CA\$ 60 000, and 45.9% had a university diploma. The mean body mass index was 27.8 ± 6.7 kg/m². Only 24.8% of women had a healthy diet according to our definition and 34.9% reported a weekly practice of at least 150 minutes of PA. Information on healthy eating (partial $R^2=0.04$; $p=0.039$) and time for meal preparation (partial $R^2=0.07$; $p=0.004$) were key beliefs for fruit and vegetable consumption. When analyzed separately, information on healthy eating (partial $R^2=0.08$; $p=0.002$) was a key belief for fruit intake and time for meal preparation (partial $R^2=0.04$; $p=0.026$) was a key belief for vegetable intake. Time for meal preparation (partial $R^2=0.04$; $p=0.038$) and having junk food on hand ($R^2=0.04$; $p=0.030$) were key beliefs for grain products consumption. Information on healthy eating (partial $R^2=0.04$; $p=0.035$) was the key belief for milk and alternatives consumption. No key beliefs were identified for meat and alternatives consumption and having someone to look after children (partial $R^2=0.07$; $p=0.031$) was the key belief for PA.

Conclusions: Diet and PA habits of women with prior GDM are not optimal. Health promotion interventions should target the key beliefs identified in this study to increase their chances of successfully changing these behaviors.

Session 1: Diabetes

85-FF9L-293

ALTERED HEPATIC PROTEIN EXPRESSION OF CYP4F IN MOUSE MODELS OF TYPE I AND TYPE II DIABETES

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Objective: Arachidonic acid (AA) is metabolized by enzymes of the cytochrome P450 (CYP) 4A and CYP4F subfamilies to generate 20-hydroxy-eicosatetraenoic acid (20-HETE), a potent vasoconstrictor which plays a detrimental role in the cardiovascular system. The CYP2C subfamily is known to catalyse the production of cardioprotective eicosanoids (EETs). There is evidence that pathophysiological conditions such as diabetes can alter the hepatic expression of CYP proteins. We have recently demonstrated a significant increase in relative protein expression of hepatic CYP4a in both Type 1 (T1D) and Type 2 (T2D) diabetes, along with a significant decrease in relative protein expression of hepatic CYP2c in T2D. In this study, we aimed to determine if TD1 and TD2 could modulate the hepatic protein expression of CYP4f.

Methods: Mouse models of T1D (streptozotocin) and T2D (C57BLKS/J-db/db) were used in this study. After sacrifice, livers were collected, washed in cold PBS and snap frozen. Total proteins were extracted using ice-cold lysis buffer. Western blots were performed to assess CYP4f protein expression.

Results: Our results showed a significant increase in relative protein expression of hepatic CYP4f in both TD1 and TD2 groups (6.86 ± 0.63 , $n=17$, $p<0.001$; 2.53 ± 0.22 , $n=19$, $p<0.001$, respectively) compared to control (1.10 ± 0.07 , $n=17$).

Conclusion: This study shows that pathophysiological conditions such as T1D and T2D alter hepatic protein expression of cytochromes P450 4F. These alterations could induce disturbances in the endogenous pathway (CYP450) of AA metabolism and increase the risk of cardiovascular disease by disrupting the fine equilibrium between cardioprotective (CYP2C-generated) and cardiotoxic (CYP4A/CYP4F-generated) metabolites of AA, pushing the balance towards the cardiotoxic side.

Session 1: Diabetes

85-HxCQ-293

IMPAIRED NONESTERIFIED FATTY ACID (NEFA) METABOLISM IN TYPE 2 DIABETES (T2D) IS RAPIDLY CORRECTED AFTER BILIOPANCREATIC DIVERSION WITH DUODENAL SWITCH (BPD/DS)

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Objectives: To determine whether an impaired lipid metabolism is involved in the progression of type 2 diabetes (T2D) in subjects with morbid obesity. The effect of biliopancreatic diversion with duodenal switch (BPD/DS) on non-esterified fatty acids (NEFA) metabolism and intravenous fat tolerance was evaluated following the intervention. The contribution of these mechanisms to the antidiabetic effects of the surgery was studied.

Methods: Morbidly obese patients with T2D (n=11) or a normal glucose tolerance (NG) (n=8) and awaiting for the BPD / DS are recruited. They undergo four sets of metabolic studies: before, 3 days, 3 months and 12 months after the intervention. A four hours euglycemic-hyperinsulinemic clamp is performed, with a perfusion of heparin and Intralipid^{MC} (IH) supplemented with [9,10-³H]-triolein. Circulating NEFA and glycerol appearance and clearance are measured by isotopic dilution of [U-¹³C]-palmitate and [1,1,2,3,3-⁵D]-glycerol. The peripheral insulin sensitivity is determined during the clamp and the hepatic insulin sensitivity is given by the HOMA-IR index. We also quantitatively determined long-chain and short-chain acylcarnitine concentrations by LC/MS/MS.

Results: T2D patients do not have different of glycerol or NEFA flux during fasting and insulin stimulation, suggesting a normal regulation of the adipose tissue lipolysis. However, we identified a defect in NEFA clearance and exaggerated glycerol production during IH infusion, confirming improper handling of circulating triglycerides. This is associated with higher short-chain and long-chain acylcarnitines levels. Three days after BPD/DS, the HOMA-IR is decreased and associated with a transitory reduction in NEFA and glycerol rates of appearance during lipid overload. Lower concentrations of C3 and C5 acylcarnitines are also found. After weight loss induced by the BPD/DS, we observed an increase in peripheral insulin sensitivity, a normalize glycerol production and an improve NEFA clearance during IH perfusion. All acylcarnitines species were reduced 3 months after the surgery.

Conclusion: All these evidences suggest that altered metabolism of exogenous fatty acids and impaired mitochondrial function explain the progression of T2D in morbidly obese subjects. These defects are normalized after BPD/DS and are associated with improved glucose metabolism.

Session 1: Ectopic Fat

85-R354-154

IMPACTS OF VISCERAL ADIPOSE TISSUE AND LIVER FAT ACCUMULATION ON CARDIOMETABOLIC DISEASES: RESULTS FROM INSPIRE ME-IAA STUDY

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Objectives: i) Quantify the variability in the association between visceral adipose tissue (VAT) and liver fat (LF) ; ii) Determine the association of VAT and LF with cardiometabolic diseases (CMD); iii) Develop a score of ectopic AT accumulation (SEATA) and determine its association with CMD.

Methods: Baseline data from the International Study of Prediction of Intra-abdominal adiposity and its Relationship with cardioMEtabolic risk have been used. A sample of 3699 subjects with VAT and LF data was included in the analyses. The subjects' medical history was evaluated using a questionnaire given to physicians. VAT and LF attenuation were assessed with two CT-scans. The SEATA ranging from 2 (low) to 8 (high) have been created by summing VAT and LF quartile scores. Odds ratio (OR) (95% CI) for type 2 diabetes (T2D), dyslipidemia, hypertension and cardiovascular diseases (CVD) (dependant variables), associated with 1 SD change of VAT and LF, then with SEATA were calculated for both sex. All logistic multivariate regression models were adjusted for age, education, smoke, ethnicity, physicians' speciality, region, BMI and CMD not considered such as dependant variables.

Results: VAT was significantly associated with LF in men ($r=-0.37$) and women ($r=-0.46$) ($p<.0001$). A one SD increase in VAT and LF were positively associated with T2D in both sex, but not with CVD. Any association between LF and hypertension in men, and between LF, VAT and dyslipidemia in women were found. Except for CVD, all associations were significant between SEATA and CMD..

Conclusions: The common variance between VAT and LF is lower than 50%, reflecting the large inter-individual variability in the AT distribution. VAT and LF in men and women seem to be associated differently to various CMD.

Figure 1: Prevalence of cardiometabolic diseases according to the score of ectopic adipose tissue accumulation in men

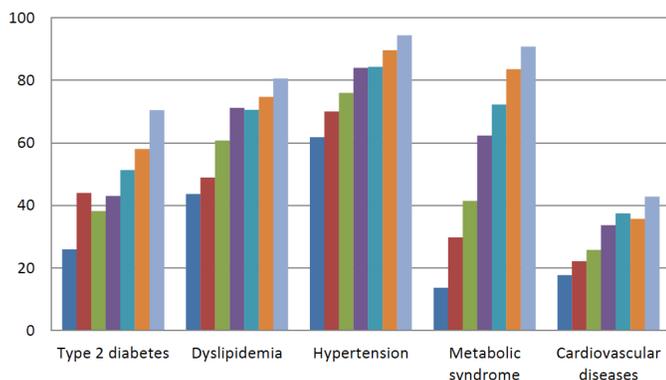
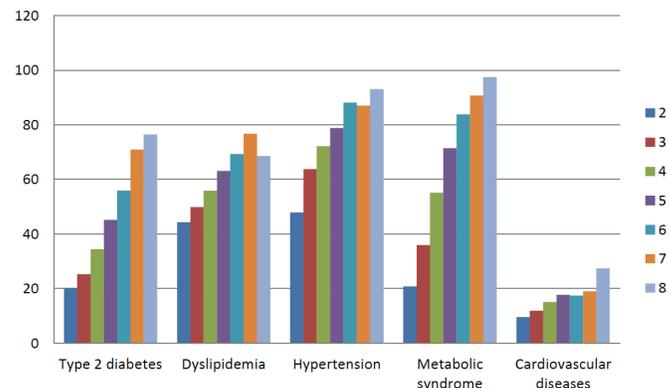


Figure 2: Prevalence of cardiometabolic diseases according to the score of ectopic adipose tissue accumulation in women



Session 1: Epidemiology

85-3Hbt-183

**DETERMINANTS FOR CANCER AND NON-CANCER DEATHS IN TAIWANESE PATIENTS WITH DIABETES:
A 17-YEAR FOLLOW-UP***Chin-Hsiao Tseng¹**¹Department of Internal Medicine, National Taiwan University College of Medicine, Taipei, Taiwan*

Objective: To investigate determinants for cancer and non-cancer death in Taiwanese patients with diabetes.

Methods: A cohort of 92546 patients recruited since 1995 was followed for vital status by matching the National Death Certificate Database until 2011. Cox regression estimated the hazard ratios for the following variables: age, sex, diabetes type, screen-detected diabetes, diabetes duration, body mass index, insulin use, hypertension, smoking, and living region. Fasting glucose and history of dyslipidemia were available for additional adjustment in a subcohort of the patients (n=14559).

Results: A total of 40229 patients (43.5% of the cohort) died during follow-up and 26.7% died under the age of 60. Age, insulin use and smoking significantly predicted cancer and non-cancer death. The adjusted hazard ratio (95% confidence interval) associated with insulin use was 1.151 (1.043-1.269) for cancer death and 1.454 (1.400-1.511) for non-cancer death. Screen-detected diabetes and body mass index were consistently associated with a lower risk, but diabetes duration a higher risk, for non-cancer death, with adjusted hazard ratio of 0.680 (0.662-0.698), 0.954 (0.951-0.957) and 1.020 (1.018-1.021), respectively. Diabetes type had a null association and living in rural areas was associated with a higher mortality disregarding the causes of death. Hypertension, fasting glucose and dyslipidemia showed differential impacts on cancer and non-cancer death, and were significantly predictive for non-cancer death.

Conclusions: Screen-detected diabetes and a higher body mass index provide a survival advantage, especially for non-cancer death. However, insulin use is associated with a significantly higher risk of either cancer or non-cancer death.

Session 1: Hypertension

85-rYRo-174

CARDIOMETABOLIC PROFILES OF HYPERTENSIVE PATIENTS PARTICIPATING IN A LIFESTYLE INTERVENTION FOR THE TREATMENT OF SYSTEMIC HYPERTENSION IN PRIMARY CARE SETTING

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Context: The Canadian hypertension education program recommends increased physical activity, adoption of the Dietary Approaches to Stop Hypertension (DASH) diet, and reduction in sodium and alcohol intake for treatment and prevention of hypertension.

Objective: To describe patients participating in an interdisciplinary lifestyle intervention to reduce blood pressure in a family medicine primary care setting.

Design: Descriptive study. Participants: The study aims to recruit 60 sedentary hypertensive patients to participate in a 6-month randomized-controlled trial. To be eligible, patients must be ≥ 18 years of age, sedentary (7-day measured steps/day and self-report), hypertensive (based on 24-h ambulatory blood pressure measurements [ABPM]), non-smoker, non-diabetic and without dyslipidemia.

Intervention: Patients are recruited by health care professionals of the family medicine unit and are thereafter randomized to one of four intervention groups: 1) standard medical care (control), 2) improved diet (DASH diet), 3) physical activity, or 4) both improved diet and physical activity. Patients are evaluated (pre, mid and post intervention), monitored, and educated by the interdisciplinary health care team that includes a physician, a kinesiologist, a nutritionist and a nurse, depending on the intervention group. T-tests and descriptive statistics were used to analyse data.

Results: To date, 49 patients were recruited, 21 were eligible and currently 19 are participating in the study (42% female, mean age: 53 ± 13 yrs, mean BMI: 30.3 ± 7.0 kg/m²). Characteristics are not different across intervention groups. The most common reason for non-eligibility was normal ABPM (50%). The sample is characterised by overweight/obesity (79%), abdominal obesity (74%) and metabolic syndrome (32%) Mean 24-hour blood pressure measurements are $134/83 \pm 8/7$ mmHg and 53% patients are on anti-hypertensive medications. Using the Framingham Risk Score, mean "cardiac" age is 58 ± 13 years, which is significantly older than the patients' actual chronological age ($+5.3$ yrs, $p < 0.003$).

Conclusion: This preliminary descriptive study demonstrates that hypertensive and sedentary patients are characterised by overweight/obesity and abdominal obesity. This study will document the efficacy of a primary care lifestyle intervention program on cardiometabolic and hypertension risk factors.

Session 1: Hypertension

85-rYRo-174

**ASSESSING AND TARGETING KEY LIFESTYLE CARDIOVASCULAR RISK FACTORS AT THE WORKPLACE:
EFFECT ON HYPERTENSION**

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¹CRIUCPQ

Objective: The present pilot project was conducted to verify whether assessing and targeting lifestyle habits at the workplace could have an impact on the hemodynamic profile of employees.

Methods: A total of 949 employees from six different companies, were involved in a pilot project of the “Grand Defi Entreprise”, a lifestyle modification program which is designed based on the key principles promoted by the American Heart Association’s Committee on Behavior Change. The challenge was conducted within each company and involved a 3-month friendly in-house competition among teams of five employees in order to favour peer support in the adoption of healthier lifestyle habits (Eat better, Move more and Quit smoking). Employees were involved in a comprehensive cardiometabolic and cardiorespiratory health assessment with a mobile risk assessment unit before and after the contest (medical history, nutrition and physical activity questionnaires, resting blood pressure, anthropometric measurements, lipid profile, and cardiorespiratory fitness). Questions on lifestyle habits (nutritional quality and physical activity level), as well as waist circumference and estimated VO₂max data were combined to generate a lifestyle risk score which could range from 4 (low estimated risk) to 16 points (high estimated risk).

Results: At the baseline evaluation, 47% of the study sample was classified as pre-hypertensive (P-HT), 24% was previously undiagnosed and untreated hypertensive (stage 1 and 2), 14 % was treated for hypertension, and 15% was normotensive (NT). The levels of hypertension were associated with waist circumference. Accordingly, subjects with P-HT, and hypertension (HT) showed a higher waist circumference compared to workers with normal blood pressure levels ($p < 0.0001$). Moreover, employees with P-HT had a lifestyle risk score which was higher than the NT ($p < 0.01$) whereas HT workers showed a higher lifestyle risk score which was also higher than P-HT and NT participants ($p < 0.01$). In response to the 3-month lifestyle modification program, both groups of employees with P-HT and HT significantly reduced their systolic ($p < 0.0001$) and diastolic ($p < 0.0001$) blood pressure.

Conclusion: Results suggest that assessing and targeting key lifestyle habits at the workplace may represent a relevant approach to target abdominal obesity and cardiorespiratory fitness with a clinically significant impact on hypertension, the so-called silent killer.

Session 1: Hypertension

85-kg24-275

INHIBITION OF FATTY ACID OXIDATION AS A POTENTIAL NOVEL TREATMENT FOR RIGHT HEART FAILURE INDUCED BY PULMONARY ARTERIAL HYPERTENSION

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Background: Pulmonary arterial hypertension (PAH) induces right ventricular (RV) failure, impaired glucose oxidation (GO) and augmented glycolysis. In this study, we hypothesized that fatty acid oxidation inhibition improved overall myocardial oxidative metabolism and attenuated PH severity.

Methods: In a rat PAH model (Sugen-Hypoxia), a malonyl CoA decarboxylase inhibitor (MCDI) was given orally (100 mg/kg/day) to inhibit mitochondrial transfer of free fatty acids. PAH rats were randomly allocated to 3 separate groups: baseline (assessed after PAH generation), treatment (MCDI for 3wks) and control (vehicle for 3wks). PAH severity was assessed by measuring pulmonary arterial acceleration time (PAAT) (echocardiography) and RV systolic pressure (RVSP) (Millar catheterization). Single-photon emission computed tomography (SPECT) was performed to assess RV ejection fraction (RVEF) using technetium-99m pertechnetate. The positron emission tomography (PET) was applied using tracers [¹⁸F]fluoro-2-deoxy-glucose (FDG) and 14(R,S)-[¹⁸F]fluoro-6-thia-heptadecanoic acid (FTHA) to measure the uptake values of glucose and fatty acids, respectively. Total myocardial oxidative metabolism was also measured by the [¹¹C]-acetate (C11) PET tracer that enters the tricarboxylic acid cycle and is cleared by mitochondrial oxidation. After sacrifice, ATP content was quantified in heart tissues.

Results: MCDI treatment was associated with an increase in PAAT (20.6±1.0 ms (treatment) versus 15.6±0.6 ms (control) and 15.7±0.6 ms (baseline); p≤0.006) and a decrease in RVSP (65.3±3 mmHg (treatment) versus 114±5 mmHg (control) and 87±3 mmHg (baseline); p=0.001). RVEF was also improved in MCDI treatment group (67.6±1.9%) compared to control (61.3±5.8%) and baseline (63.6±2.4%) groups. The RV/LV FTHA uptake ratio was decreased in the treatment group (78±3%) compared to control (87±19%) and baseline (91±17%). Although the FDG uptake rate was equivalent between groups, overall oxidative metabolism was greater in MCDI treatment as suggested by increased C11 clearance rate in MCDI-treated rats (33±0.9%) compared to control (21±8%) and baseline (28±4%). The RV normalized ATP level of MCDI-treated rats was increased compared to vehicle-treated rats (1.01±0.07 versus 0.80±0.01; p=0.04).

Conclusion: MCDI treatment was associated with a reduction in PAH severity, increased cardiac ATP content, augmented C11 clearance rate, reduced FTHA uptake and maintained FDG uptake. This metabolic modulation therapy may represent a means to treat or prevent RV dysfunction.

Session 1: Insulin Resistance

85-LvHh-283

THE HOMA-ADIPONECTIN (HOMA-AD) INDEX AS A SURROGATE MARKER OF INSULIN RESISTANCE IN THE BRAZILIAN METABOLIC SYNDROME STUDY - BRAMS

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Objectives: The assessment of insulin resistance (IR) in clinical practice and in epidemiological studies is of great relevance. The present study aimed to evaluate the performance of the Homeostasis Model Assessment–Adiponectin (HOMA-AD) index, compared to the well-established HOMA-IR index, as a useful surrogate marker of IR and to establish the cutoff value of HOMA-AD for screening IR.

Methods: This is a cross-sectional analysis from a multicenter survey carried out in Brazil. Data from 1062 subjects met the desired criteria: women, 18-65 years old, BMI: 18.5-49.9 kg/m², and non-diabetic. The IR was assessed by the fasting indices HOMA-IR and HOMA-AD (total sample), and by the hyperglycemic clamp test in a random subsample (5% of the total sample). The metabolic syndrome (MS) was defined using the International Diabetes Federation criteria. The statistical analyses were performed using IBM SPSS-Statistics version 20.0. Significance was set at $p < 0.05$.

Results: For the IR assessed by the hyperglycemic clamp, the HOMA-AD index demonstrated a stronger coefficient of correlation ($r = -0.64$) compared to the HOMA-IR index ($r = -0.56$); $p = 0.0001$. In the ROC analysis, the HOMA-AD compared to the HOMA-IR, showed higher values of AUC for the identification of IR based on the clamp test (AUC: 0.844 ± 0.060 vs AUC: 0.804 ± 0.074 ; $p = 0.0010$) and on the MS criteria (AUC: 0.703 ± 0.020 ; $p = 0.0001$ vs. AUC: 0.689 ± 0.021 ; $p = 0.0001$), respectively. However, the pairwise comparison did not evidence superiority for the HOMA-AD in comparison with the HOMA-IR in the clamp test ($Z = 1.022$; $p = 0.307$) and considering the MS criteria ($Z = 0.956$; $p = 0.339$). The optimal cutoff identified for the utilization of the HOMA-AD index for the screening of IR in women was 0.51 [sensitivity: 70.0 (63.5–75.9); specificity: 60.3 (56.8–63.6)].

Conclusions: the HOMA-AD index demonstrated to be a useful surrogate marker for detecting IR among adult women, presenting similar performance compared to the HOMA-IR index. These results are helpful for physicians and researchers in settle on which method to use in the IR evaluation in light of available facilities.

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Session 1: Insulin Resistance

85-Z364-124

ASSOCIATION OF PHYSICAL ACTIVITY ENERGY EXPENDITURE AND CARDIORESPIRATORY FITNESS WITH CHANGES IN INSULIN ACTION*William Bostad¹, Paula Stotz¹, Robert Ross¹**¹Queen's University*

Objectives: The objective of this study was to compare the ability of objectively measured physical activity energy expenditure (PAEE) and cardiorespiratory fitness (CRF) to predict changes in insulin action.

Methods: Participants were 116 middle aged (52.2 ± 8.0 yrs) adults that participated in a randomized controlled exercise trial. CRF (VO_{2peak}) was measured using a maximal treadmill test. Physical activity (PA) was quantified objectively as supervised exercise and unsupervised PAEE. Supervised exercise-induced energy expenditure was determined using an individually adjusted heart rate to energy expenditure relationship and was calculated subsequent to each session. Unsupervised PAEE was measured by ActiGraph accelerometers worn 4-7 days multiple weeks throughout the trial and quantified as energy expenditure using a standard equation. An oral glucose tolerance test was used to determine insulin action variables.

Results: Change in CRF predicted change in insulin area under the curve ($\beta = -.194$, $P = .042$), change in the Matsuda index ($\beta = .300$, $P = .001$) and change in the homeostatic model assessment of insulin resistance (HOMA) ($\beta = -.193$, $P = .038$) independent of PAEE, age and sex. PAEE was not an independent predictor of change in insulin area under the curve, change in the Matsuda index or change in HOMA after adjusting for change in CRF, age and sex ($P > .05$). After further adjustment for change in waist circumference (WC), neither change in CRF nor PAEE were significantly associated with changes in insulin area under the curve, the Matsuda index or HOMA ($P > .05$). However, change in WC was significantly associated with changes in insulin area under the curve ($\beta = .249$, $P = .027$) and the Matsuda index ($\beta = -.313$, $P = .004$), but not HOMA ($\beta = .061$, $P = .583$), independent of change in CRF, PAEE, age and sex.

Conclusions: Contrary to previous findings, CRF was a stronger marker of insulin action than objective PAEE. Secondary analysis adjusting for WC revealed that changes in abdominal adiposity may mediate the association between PAEE, CRF and insulin action.

Session 1: Insulin Resistance

85-YV9U-56

TREATMENT WITH TP-113 INCREASES PROTECTIN DX AND IL-6 PRODUCTION IN SKELETAL MUSCLE AND REDUCES INSULIN RESISTANCE IN OBESE DIABETIC DB/DB MICE

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Objectives: We previously reported that low biosynthesis of long-chain ω -3 fatty acid-derived pro-resolution mediators, termed protectins, are associated with an impaired global resolution capacity, inflammation and insulin resistance in obese high-fat diet-fed mice. We also found that one protectin isomeric form, termed protectin DX (PDX), which is a di-hydroxylated product of docosahexaenoic acid (DHA), exerts an unanticipated glucoregulatory activity through stimulating the release of the prototypic myokine interleukin-6 (IL-6) from skeletal muscle. This triggers a myokine-liver signaling axis, which improves insulin sensitivity and glucose disposal in lipid-infused as well as in obese diabetic db/db mice (Nat Med 20(6):664-9, 2014). These findings prompted us to evaluate the therapeutic potential of DHA for alleviating insulin resistance in obese diabetic mice.

Methods: In the present study we have tested the effect of oral treatment of db/db mice with TP-113 (Thetis Pharmaceuticals), a unique ionic structure that delivers metformin and DHA from a single chemical entity.

Results: We found that TP-113 treatment raises DHA and PDX levels in skeletal muscle and that this was associated with increased IL-6 production in this tissue. Determination of insulin sensitivity for glucose disposal using the hyperinsulinemic-euglycemic clamp technique further revealed that long-term (5 weeks) oral treatment with TP-113 reduces insulin resistance in db/db mice as compared to vehicle treatment. Moreover, an equimolar concentration of metformin alone failed to significantly decrease insulin resistance in the same conditions.

Conclusion: We conclude that TP-113 improves insulin sensitivity in obese diabetic mice in association with activation of the PDX/ IL-6 signaling axis. Our data further indicate that TP-113 has more efficacious for the treatment of insulin resistance as compared to metformin alone.

Session 1: Lipids/Lipoproteins

85-2149-94

IMPACT OF A 1-YEAR LIFESTYLE MODIFICATION PROGRAM ON HDL CHOLESTEROL EFFLUX CAPACITIES IN PATIENTS WITH CORONARY ARTERY DISEASE

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Objectives: To determine whether a 1-year lifestyle modification program aiming at increasing physical activity levels and improving diet quality influences HDL quantity and quality in post coronary artery bypass graft (CABG) patients.

Methods: A total of 80 men aged between 35 and 80 years and undergoing CABG surgery participated in a 1-yr 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. HDL cholesterol efflux capacities (CECs) were measured in apolipoprotein B-depleted serum of patients before and after the 1-year intervention using 3-H cholesterol labelled HepG2 cells. Anthropometric variables, a completed lipoprotein-lipid profile 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: Following the intervention, men had significantly higher level of plasma HDL cholesterol and apolipoprotein (apo) A-1 ($1,32 \pm 0,35$ mmol/L vs. $1,19 \pm 0,33$ mmol/L, $p < 0,001$ and $1,41 \pm 0,20$ g/L vs. $1,34 \pm 0,21$ g/L, $p < 0,001$ for HDL cholesterol and apoA-1, respectively). HDL CECs were also significantly higher after the intervention ($6,27 \pm 1,09$ % vs. $5,85 \pm 1,08$ % $p < 0,001$). HDL CECs changes were modestly associated with changes in HDL cholesterol ($r = 0,20$, $p = 0,08$) and apoA-1 ($r = 0,36$, $p < 0,001$) levels. HDL CECs changes were also associated with changes in visceral AT ($r = -0,30$, $p = 0,01$), the sum of epi- and pericardial AT ($r = -0,24$, $p = 0,04$) and fasting insulin levels ($r = -0,36$, $p = 0,002$).

Conclusion: Results of this study suggest that increasing physical activity levels and improving diet quality can have a significant and positive impact on both HDL quantity and quality in patients with coronary artery disease. Whether lifestyle-mediated changes in HDL function influences cardiovascular outcomes needs to be documented in larger scale intervention studies.

Session 1: Lipids/Lipoproteins

85-81Ui-114

TURN OFF AND TURN IN: THE INFLUENCE OF TELEVISION VIEWING AND SLEEP ON LIPID PROFILES IN CHILDREN

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Background: Physical activity is beneficial to lipid profiles, however the association between sedentary behaviors and pediatric dyslipidemia remains controversial. Understanding these associations is critical given that youth are increasingly engaging in sedentary pursuits, and are sleeping, on average, 1 hour less than children were 20 years ago.

Aims and objectives: To investigate whether various forms of sedentary behavior/sleep predict lipid profiles in children over a 2-year period.

Methods: Data from 630 children living in Quebec, Canada, with at least one biological parent with obesity (QUALITY cohort) were collected at both 8-10 years and 10-12 years. Sedentary behavior, sleep time and moderate-to-vigorous physical activity (MVPA) were measured over 7 days using accelerometry, with sedentary behavior defined as the average minutes daily at <100 counts/min. Sleep time was derived from accelerometer non-wear time. Screen time, computer/video game use and TV viewing over the past 7 days were self-reported. Adiposity was measured using DXA scan and dietary carbohydrate/fat intake by an average of three 24 hour dietary recalls. Outcomes included fasting total cholesterol, triglycerides, HDL-cholesterol and LDL-cholesterol. Multivariable models adjusted for MVPA, fitness, adiposity and diet.

Results: Every additional hour of TV time at baseline predicted a 7.4% (95% CI = 3.9; 10.9) increase in triglycerides and 2.1% (95% CI = -3.7; -0.5) decrease in HDL. These findings held true for triglycerides after adjusting for adiposity, dietary carbohydrate and sugar-sweetened beverages. Every additional hour of sleep predicted a 4.1% (95% CI = -7.9; -0.3) decrease in LDL even after controlling for sedentary behavior and dietary fat intake.

Conclusions: Higher time spent engaged in TV watching and lower sleep appear to be deleterious to childhood lipid profiles over time, even when taking into account other major lifestyle habits.

Session 1: Lipids/Lipoproteins

85-AYeh-56

CHANGES IN IGFBP-2 FOLLOWING LIFESTYLE MODIFICATION ARE INCREMENTALLY LINKED TO IMPROVED LIPOPROTEIN-LIPID PROFILE AND INDEPENDENTLY ASSOCIATED WITH CHANGES IN LDL APOB

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Background: Dysfunctions in lipid metabolism are one of the first contributors to cardiovascular complications. In recent years, lower levels of circulating insulin-like growth factor binding protein (IGFBP)-2 have been associated with increased fat mass, insulin resistance and abnormalities in the lipoprotein-lipid profile.

Objective: To determine the impact of a 1-year lifestyle modification program on IGFBP-2 circulating levels, and to test the hypothesis that changes in IGFBP-2 are associated with improvements in the lipoprotein-lipid profile.

Methods: One hundred and forty four overweight sedentary men, between the ages of 30-65 years, presenting abdominal obesity, triglyceride levels ≥ 1.69 mmol/L and/or HDL-cholesterol < 1.03 mmol/L, were recruited by solicitation in the media, for a one-year lifestyle modification program combining diet and exercise to reach a daily deficit of 500 calories. Subjects with type 2 diabetes, body mass index (BMI) values < 25 or > 40 kg/m², or taking medication targeting glucose or lipid metabolism or blood pressure were excluded. Anthropometric data were collected and plasma IGFBP-2 concentrations, glucose tolerance and an extensive plasma lipid profile were determined after an overnight fast.

Results: The lifestyle modification program produced improvements in cardiometabolic parameters as well as an increase in IGFBP-2 levels. Men who experienced the most substantial increase in their IGFBP-2 levels lost more weight ($p < 0.0001$), had the most important reduction in body mass index ($p < 0.0001$) and showed the greatest increase in cardiovascular fitness ($p = 0.01$). Men with the highest increase in IGFBP-2 also displayed the largest reduction in plasma TG (-0.90 ± 0.56 mmol/L, $p = 0.0004$), cholesterol (-0.29 ± 0.82 mmol/L, $p = 0.01$) and apo B (-0.11 ± 0.17 g/L, $p = 0.0006$) levels. The association between changes in IGFBP-2 and in LDL apoB were independent of modifications in waist circumference and insulin sensitivity.

Conclusion: Lifestyle modification triggered an increase in IGFBP-2 levels that were incrementally linked to changes in the lipoprotein-lipid profile. After adjustments for covariates, changes in IGFBP-2 levels were significantly associated with those in LDL apoB suggesting a potential link between IGFBP-2 and peripheral lipid clearance.

Session 1: Metabolic Syndrome

85-P8mX-82

EFFECTS OF ω 3 FATTY ACIDS AND CONJUGATED LINOLEIC ACID ON INSULIN RESISTANCE, PLASMA LIPIDS AND OXIDATIVE STRESS IN FRUCTOSE-FED RATS*Dalila Ait Yahia¹, Abdullah Sener², Willy J Malaisse³**¹Université Es-Séniá, Faculté des Sciences de la Nature et de la Vie, Département de Biologie, BP**²Laboratoire de Physiologie et de Pharmacologie, Faculté de Médecine, Université Libre de Bruxelles**³Département de Biochimie. Université Libre de Bruxelles. Route de Lennik 808, B-1070 Bruxelles*

The aim of this investigation was to explore the capacity of ω 3 or CLA supplementation to improve insulin resistance, hypertension, abnormalities of lipid and oxidative stress in animal model of metabolic syndrome induced by a high fructose diet.

Twenty four female Wistar rats were exposed to diets containing either 64% (w/w) starch and 5% sunflower oil(C) or 64% fructose (F), 64% fructose enriched by 1.6% polyunsaturated fatty acids ω 3 (F- ω 3), or 64% fructose enriched by 1.6% conjugated linoleic acids (F-CLA) during 2 months. Fasting glucose homeostasis (glycemia, insulinemia), an intraperitoneal glucose tolerance test, plasma and liver lipid profile and muscle oxidative stress were measured.

The data revealed that fructose diet promotes the development of obesity, hypertension and glucose intolerance and increased HbA1C but reduced liver glycogen. Administration of ω 3 improved insulin resistance and insulinogenic index, decreased glycemia and HbA1C and increased liver glucokinase and glycogen. The CLA supplementation induced glucose intolerance and insulin resistance, despite of low HbA1C. Addition of fructose to diet increased circulating triglycerides (TG), total cholesterol (TC) and phospholipids (PL) levels and led to hepatic steatosis by increasing TG, TC, and PL concentrations. Exposition to ω 3 diet decreased plasma and liver TG, CT and PL. CLA supplementation lowered plasma TG and PL and improved fatty liver as compared to F diet. In parallel, fructose diet elevated muscle TBARS, hydroperoxyde, carbonyl and NO levels associated with decreased SOD and CAT activities and enhanced GSH-Red. The ω 3 and ALC treated rats displayed significant lower muscle TBARS, hydroperoxyde and carbonyl levels and higher SOD and CAT activities and lower GSH-Red. These beneficial effects of ω 3 and CLA act by preserving antioxidant mechanisms and protecting cellular components of several oxidative damages, which increase thus the nutrients efficiently utilization.

In conclusion, supplementation of ω 3 or CLA exerts favorable effects in correcting the abnormalities associated to metabolic syndrome such as improving blood pressure, dyslipidemia and oxidative stress; this suggests that these bioactive lipids might be able to be used as nutraceutical nutrients in the prevention and/or treatment of metabolic syndrome.

Session 1: Metabolic Syndrome

85-ULDS-124

IN CARDIO-CEREBROVASCULAR DISEASE THE LOW LEVEL INFLAMMATION IS LINKED TO NUMBER OF METABOLIC SYNDROME COMPONENTS*Loan Gutiu¹, Laurentiu Gutiu², Flavian Radulescu¹**¹"Carol Davila" university of medicine and pharmacy**²Pra health sciences, Germany*

Objectives: To study possible relationships between low level inflammation syndrome, and components of metabolic syndrome (NCEP-III) (MbS) using actual knowledge in the field of atherogenesis.

Methods: We analyzed in a cross-sectional study 769 patients (mean age 57+/-12 years, 363 male - 47%) with atherosclerosis complications: coronary disease - 438 (57%), stroke -280 (36%), ischemic cardiomyopathy - 51 (7%). We compared the presence of inflammatory syndrome in groups made up from components of MbS (from 0 to 5 components). We appreciated the no-specific inflammation by serum fibrinogen (sF), CRP, BSR, leukocytes and number of teeth loss (as a consequence of chronic gum inflammation such as parodontitis, parodontosis) (TL).

Results: Partition of inflammation in groups made-up of MbS components was: no components 33 (4%), 1 component 150 (20%), 2 -154 (20%), 3-254 (33%), 4-129 (17%), 5 - 49 (6%). In no component group we found: sF=320,5+/-44,0 mg%, BSR =14,2+/-9,9 mm/1 h, increased CRP level in 9 patients, leukocytes=6500+/-1150, TL number=4,6+/-2,5. In 5 components group: sF=399,3+/-58,2 mg% (P<0,001 versus no component group), BSR =27,0+/-11,2 mm/1 h (P<0,001), increased CRP in 11 patients (P<0,557), leukocytes=12111+/-2103 (P<0,001), TL=11,7+/-7,7 (P<0,001). In other groups we found intermediate differences.

Conclusions: We confirmed an early research on a more reduced number of patients; we found that the number of MbS components is accompanied by an inflammatory syndrome progressively increased, possible intervention of visceral obesity (cytokines secretion), low level of HDL-cholesterol, etc. As a consequence we consider necessity for routine testing of all analyzed inflammatory markers including dental state appreciation of patients.

Session 1: Metabolic Syndrome

85-MK51-294

USE OF BLOOD AS A SURROGATE MODEL FOR THE ASSESSMENT OF ADIPOSE TISSUE METHYLATION PROFILES ASSOCIATED WITH OBESITY-RELATED METABOLIC COMPLICATIONS

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Objective: The objective of this study was to test blood genome-wide CpG sites methylation levels as a surrogate model for visceral adipose tissue (VAT) methylation profiles as well as to validate whether this tissue appropriately reflects differences in methylation levels found in VAT between men discordant for the metabolic syndrome (MetS).

Methods: Tissue specimens (VAT and blood samples) were obtained from a subset of 16 severely obese individuals selected based on the presence or the absence of the MetS defined using the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATPIII) criteria. Genomic DNA was extracted from VAT and blood buffy coat. CpG sites methylation levels were measured for more than 485,000 methylation sites at single-nucleotide resolution using the Infinium HumanMethylation450 BeadChip (Illumina, San Diego, CA). Correlations of methylation levels between VAT and blood were computed for all non-polymorphic CpG sites. Differences in methylation levels between individuals with and without MetS were tested in both tissues using Student's t-test in the GenomeStudio software.

Results: A difference in the distribution of genome-wide CpG sites methylation levels between tissues was observed, with blood demonstrating a higher number of highly methylated sites (> 75% methylation) than VAT (216,241 in blood vs. 181,128 in VAT; $p < 0.0001$). Overall, high intra-individual correlation was observed between tissues (0.952 ± 0.014). Differential methylation analysis between individuals with and without the MetS in both tissues demonstrated a higher number of differentially methylated CpG sites in VAT versus blood (40,221 vs. 11,581, respectively) with 5% of the differentially methylated CpG sites found in VAT being also represented in blood.

Conclusion: High intra-individual correlations were found between CpG methylation of VAT and blood. Results of the present study suggest that blood methylation levels of specific CpG sites may adequately reflect VAT methylation levels of metabolic syndrome-related genes.

Session 1: Nutrition

85-TULe-243

ASSOCIATIONS BETWEEN DAIRY CONSUMPTION AND CLINICAL OUTCOMES: RESULTS FROM A SYSTEMATIC REVIEW OF META-ANALYSES OF PROSPECTIVE COHORT STUDIES

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Objective: To evaluate the association between dairy consumption and clinical outcomes [CVD, CHD, stroke, hypertension, type 2 diabetes (T2D) and metabolic syndrome (MetS)] and the quality of evidence supporting these associations.

Methods: Two independent investigators conducted a systematic review of published meta-analyses of prospective cohort studies and of recent prospective cohort studies having assessed the association between dairy consumption (total, high-fat, low-fat, milk, cheese, yogurt, fermented) and the risk of different clinical outcomes. PUBMED and EMBASE databases were searched up to march 2015 to identify studies. The quality of evidence relating dairy intake to clinical outcomes was rated using the Grading of Recommendations Assessment, Development and Evaluation scale (high, moderate, low or very low quality).

Results: Evidence supports a neutral association between consumption of total dairy and cheese and CVD risk and between total dairy, high-fat dairy, low-fat dairy, milk and CHD risk. Consumption of total dairy, low-fat dairy, fermented dairy and cheese was associated with a reduced risk of stroke, while intake of high-fat dairy and milk was not. A beneficial association between total dairy, low-fat dairy, milk and the risk of hypertension was also observed. High-fat dairy, cheese, yogurt and fermented dairy showed no association with the risk of hypertension. Evidence suggests that intake of total dairy, low-fat dairy, cheese and yogurt is associated with a lower risk of T2D, which is not the case for high-fat dairy, milk and fermented dairy. Moderate to high quality evidence supports all of these observations. All other associations, including those between dairy intake and MetS, cannot be determined with confidence considering the poor quality of evidence available so far.

Conclusion: There is moderate quality to high quality evidence suggesting that associations between dairy product consumption and risk of CVD, CHD, stroke, hypertension and T2D are either neutral or favorable. There is no evidence indicating that dairy intake is associated with an increased risk of any of these clinical outcomes.

Session 1: Nutrition

85-EJL6-253

**ENHANCING KNOWLEDGE TRANSLATION IN NUTRITION THROUGH A HEALTHY EATING BLOG :
PRELIMINARY RESULTS OF A FEASIBILITY STUDY***Marie-Eve Caplette¹**¹Institute of Nutrition and Functional Foods, Laval University,*

Objective: Our study aims to conduct a preliminary assessment of the feasibility of using an evidence-based healthy eating blog (HEB) promoting the consumption of fruit and vegetables (F&V) among women, prior to undertaking a full randomized controlled trial (RCT).

Methods: Eighty women aged 18 years and older (average 42 ± 13 years) eating less than five servings per day of fruit and vegetables (average 4.9 ± 4.2 servings) were recruited. Participants were randomized to the HEB group (n=40), which includes a weekly blog post over a six-month period, or to a control group (n=40) that has no exposure to the HEB. The development of the intervention was inspired by the steps of the Intervention Mapping framework. Blog posts focus on the improvement of F&V consumption targeting four main determinants of the behavior: (1) knowledge; (2) attitude; (3) self-efficacy; and (4) motivation/goals. Feasibility is assessed by collecting blog browsing history data for each participant and registering dropout rates.

Preliminary results: During the first two months of the study, ten posts were published on the blog. Two were already posted on the blog when participants were given their login information and included general nutrition knowledge about what constitutes a healthy diet and the importance of F&V consumption. Since then, one post is being published each week. During the first month, each participant logged on the blog 10.0 ± 6.2 times and published 3.5 ± 0.9 comments on average. A decrease in blog utilization was observed during the second month with an average per participant of 5.3 ± 3.6 logins and 1.9 ± 1.9 comments published. So far, no participant dropped out of the study.

Conclusion: Blog utilization statistics collected during the first two months of intervention tend to suggest that a study using a blog to deliver a nutritional intervention is feasible. However, participation will have to be maintained during the four upcoming months to confirm the feasibility of the study prior to conducting a full RCT.

Session 1: Nutrition

85-Vod8-114

PLANNING A LIFESTYLE MODIFICATION PROGRAM TO MANAGE HYPERTENSION IN PRIMARY CARE: RATIONALE AND DESIGN OF THE NUTRITIONAL INTERVENTION

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Objective: To describe the rationale and design for the development of a successful nutritional intervention, which is part of a lifestyle modification program intended to manage hypertension in primary care.

Methods: The nutritional intervention was developed following the framework of the Intervention Mapping (IM) approach, which is a systematic method aimed to guide development, implementation and evaluation of health promotion programs. Based on a literature review, the first three steps were applied to develop the rationale and design of the nutritional intervention: 1) Assess the health problem, the behavioral and environmental causes of the problem, and determinants of the behavioral and environmental causes; 2) Create a matrix of objectives (outcomes) based on the most effective health-related behaviors, and select the most important and changeable determinants of those behaviors, and; 3) Choose theoretical methods and practical applications to change the determinants of health behaviors.

Results: Table 1 presents steps one to three of the IM approach supporting the rationale and design of the nutritional intervention settled to manage hypertension in primary care.

Conclusions: The creation of a structured nutritional intervention based on robust psychological theories and current evidence contribute to identify the best strategies to promote healthy dietary changes. According to IM, next steps of the planning will be to produce the program components and the materials (step 4), to implement the program (step 5) and to evaluate the program (step 6). This approach will support translation knowledge and improve management of cardiometabolic risk factors.

Table 1. Rationale and design of the nutritional intervention to manage hypertension in primary care based on Intervention Mapping approach

Intervention Mapping	
Step 1. Needs Assessment	
Health Problem	Hypertension
Behavioral and environmental causes	<ul style="list-style-type: none"> • Unhealthy diet • Sedentariness • Smoking • Excessive alcohol • Inadequate stress management
Population	<ul style="list-style-type: none"> • Systolic blood pressure between 140 and 159 mm Hg • Diastolic blood pressure between 90 and 99 mm Hg
Step 2. Matrix of Change Objectives	
Behavioral determinant	Healthy diet
Performance objectives	<ul style="list-style-type: none"> • Sodium: < 2000 mg per day • Fruits and vegetables: ≥ 4.5 cups per day • Fish (preferably oily fish): 2 x 3.5 oz per week
Personal determinants	Self-efficacy, habit, motivation, knowledge, goal, taste.
Step 3. Theory-Informed Intervention Methods and Applications	
Methods	Individualization, tailoring, implementation intention, feedback, planning coping responses.
Practical applications	One-to-one instruction and brochures.

Session 1: Nutrition

85-gV6T-134

DEVELOPMENT AND PRETEST OF A WEB-BASED 24-HOUR DIETARY RECALL

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Objective: To develop and to assess the usability of an automated self-administered 24-hour recall web application (R24W).

Methods: The development of the R24W was inspired by the USDA Automated Multiple-Pass Method. An organized list of commonly consumed food including multi-ethnic food was created. To enable automatic extraction of nutrient values, each food was linked to the Canadian Nutrient File (CNF, 2010 version) or the USDA Nutrient Database for Standard Reference (when the food was not available in the CNF). For mixed dishes, recipes were created using foods from the CNF. Questions about the context of meals and snacks were included. Toppings, sauces, and spices frequently added to each food or dish were suggested systematically. A list of frequently forgotten food was also suggested after the entering of each meal and snack and at the end of the R24W. An interactive summary allows respondent to track the progress of the questionnaire and to modify or remove food as needed. A summary showing all meals and snacks provides a comprehensive overview and offers one last chance to make any change to the report. In order to allow the assessment of the overall quality of the diet, all food items (single food and mixed dishes) were coded according to different nutritional criteria to enable automatic calculation of diet quality scores. To assess the usability of the R24W, a functional prototype was tested with 29 participants with various profiles in term of age, computer skills, education level and involvement in meal preparation at home.

Results: The R24W includes a list of 2865 food items distributed into 16 categories and 98 subcategories. A total of 687 recipes were created for mixed dishes, including 336 multi-ethnic recipes. Food pictures illustrate up to 8 servings per food item. The web-based platform allows respondents to select an unlimited number of meals and snacks per 24-hour period. The usability test demonstrated that the R24W is easy to complete and to understand.

Conclusion: This new dietary assessment tool is a simple and inexpensive tool to use that will facilitate diet assessment of individuals in large-scale studies. Supported by a grant from the Canadian Institutes of Health Research (CIHR)

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Session 1: Nutrition

85-9PEP-174

CONSUMPTION OF SUGAR-SWEETENED BEVERAGES (SSBs) AS AN INDICATOR OF NUTRITIONAL QUALITY, BODY COMPOSITION AND CARDIOMETABOLIC RISK FACTORS

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¹CRIUCPQ

Objective: Evaluate sugar-sweetened beverages (SSB) consumption as a marker of nutritional quality and cardiometabolic risk profile.

Methods: A cohort of 3312 individuals has been recruited through the « Grand Défi Entreprise » a lifestyle modification program designed for the workplace. Employees were submitted to anthropometric measurements (waist circumference, body mass index, body fatness), nutritional evaluation, including the nutritional quality index (NQI) derived from the Bailey questionnaire, and to a cardiometabolic risk profile evaluation (lipid and lipoprotein concentrations). Moreover, participants were asked to report their SSBs consumption on the basis of five categories: never ; <1 SSBs/week ; 1 to 2 SSBs/week ; 3 to 6 SSBs/week ; and one or more SSBs/day (daily).

Results: 32.6% reported never consuming SSBs (NC) whereas 29.7% consumed <1 SSBs/week, 17.4% consumed between 1 to 2 SSBs/week, 11.5% consumed between 3 to 6 SSBs/week and 8.8% were daily consumers. Daily consumers of SSBs showed a lower NQI than NC (52.3% vs. 66.6%, $p<0.001$). Overall, daily SSBs consumers were also regular consumers of pastry and candy foods (49.2% vs. 68.6%, $p<0.001$), added fat (butter, oil, etc.) (22.0% vs. 43.6%, $p<0.001$) and deli meats (64.8% vs. 83.2%, $p<0.001$). Daily SSB drinkers consumed less whole grain foods (36.1% vs. 62.3%, $p<0.001$) and fish (28.5% vs. 49.7%, $p<0.001$) compared to NC. They also consumed less fruits (66.2% vs. 78.3%, $p<0.001$) and vegetables (74.0% vs. 84.3%, $p<0.001$) than NC. Furthermore, daily consumers of SSBs also presented a more deteriorated cardiometabolic risk profile ($p<0.05$) and increased levels of anthropometric variables reflecting adiposity ($p<0.01$).

Conclusion: SSBs consumption was found to be an indicator of global nutritional quality also related to and overall deterioration of the cardiometabolic risk profile.

Session 1: Obesity

85-LDMJ-253

DECREASED MYOCARDIAL TYPE I COLLAGEN IN OBESE RATS FED AN UNSATURATED HIGH-FAT DIET IS ASSOCIATED WITH INCREASED METALLOPROTEINASE 2 AND 9 ACTIVITY

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Objective: In recent research conducted in our laboratory, we found decreased protein levels of myocardial type I collagen in obese Wistar rats by unsaturated high-fat diet for 30 weeks. Due to the results found in our laboratory and because the literature shows that leptin increases metalloproteinases (MMP)-2 activity and MMP-9 gene expression, the purpose of this study was to test the hypothesis that the reduction of myocardial type I collagen is associated with increased MMPs 2 and 9 activities in obese rats by unsaturated high-fat diet.

Methods: Thirty-day-old male Wistar rats were randomized into two groups: control (C; n=25), fed a standard diet and obese (Ob; n=25), fed cycles of four high-fat diets for 30 weeks. Obesity was characterized by the adiposity index, calculated by the sum of the epididymal, retroperitoneal and visceral deposits. The nutritional and metabolic profiles were evaluated. The cardiac remodeling process was analyzed by structural and molecular studies; the hypertrophy was assessed post-death by macroscopic analysis and the molecular analysis of type I collagen, leptin and tissue inhibitors of metalloproteinases (TIMPs) proteins expression was performed by Western Blot and the MMP-2 and 9 activities were performed by zymography. Data were reported as mean \pm SD and submitted Student's t-test. The associations between certain variables were performed by Pearson's correlation test. The significance level was 5%.

Results: The Ob animals showed increased final body weight, total body fat and adiposity index compared to C. Some comorbidities often associated with experimental obesity, such as glucose intolerance, hyperinsulinemia, hyperleptinemia and hypertension, were observed. Obesity promoted reduction of type I collagen, and TIMPs 1 and 2 protein expression, and it increased the activity of MMPs 2 and 9 and cardiac leptin. The analysis of association showed significant correlation between type I collagen and MMP-2, type I collagen and MMP-9, MMP-2 and leptin, MMP-9 and leptin, TIMPs 1,2 and MMP-2, MMP-9 and TIMP 1, and TIMP 1 and leptin.

Conclusion: The hypothesis of this study was confirmed as the reduction of type I collagen is associated with increased activity of MMPs 2 and 9 in obese rats by unsaturated high-fat diet.

Session 1: Obesity

85-9VcG-263

LONG-TERM INTERDISCIPLINARY THERAPY DECREASES SYMPTOMS OF BINGE EATING DISORDER AND RISK OF METABOLIC SYNDROME IN OBESE ADULTS

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Objectives: The aim of this study was to determine long-term (1-year) clinical trial with interdisciplinary therapy in predicting the risk of metabolic syndrome and the symptoms of binge eating disorder among obese adults.

Methods: The study was conducted in longitudinal character, a total of 24 obese subjects were recruited (age 41.21±6.28 and BMI 34.80±3.17) who participated in an interdisciplinary therapy program for 32 weeks. Anthropometry was evaluated through the data on weight and height, to obtain the body mass index, waist circumference and hip circumference. Body composition was assessed by dual-energy x-ray absorptiometry (DEXA). The degree of symptoms of binge eating was evaluated by the binge eating scale (BES).

Results: Long-term interdisciplinary therapy promoted an improvement in the predictors of metabolic syndrome and symptoms of binge eating as demonstrated in Table 1. Moreover, we observed after the correlation analysis between BES and the variables in study, there was a positive correlation with Triglycerides (r=0.33), High-Density Lipoprotein (r=-0.33), Body Fat (r=0.44), Fat Free Mass (r=-0.39), Android Fat (r=0.35), Gynoid Fat (r=0.41), Trunk Fat (r = 0.36).

Table 1. Effect of interdisciplinary therapy on symptoms of binge eating and predictors of risk for metabolic syndrome.

Variables	Baseline	After Therapy	Δ Value	p Value
Body Weight (Kg)	96.87±12.73	90.38±12.17	6.49	0.001*
Body Mass Index (Kg/m ²)	34.80±3.17	32.40±3.08	2.40	0.001*
Systolic Blood Pressure (mmHg)	125.00±10.22	117.83±12.78	7.39	0.002*
Diastolic Blood Pressure (mmHg)	82.50±9.89	80.00±8.26	2.61	0.307
Waist Circumference (cm)	108.45±8.99	102.54±8.70	5.91	0.001*
Hip Circumference (cm)	121.42±8.43	116.53±7.74	4.89	0.001*
Triglycerides (mg/dL)	149.66±28.34	138.03±21.98	10.63	0.137
High-Density Lipoprotein (mg/dL)	38.40±9.07	53.48±12.70	-14.05	0.001*
Binge Eating Scale (Score)	12.96±7.65	4.83±3.58	8.13	0.001*
Body Fat (%)	48.17±5.36	46.00±5.15	2.17	0.001*
Body Fat (Kg)	44.40±7.09	39.67±6.41	4.73	0.001*
Fat-Free Mass (%)	51.83±5.36	53.80±5.32	-1.97	0.004*
Fat-Free Mass (Kg)	50.82±9.20	49.79±9.07	1.03	0.025*
Android Fat (%)	50.28±5.27	46.87±4.31	3.40	0.001*
Gynoid Fat (%)	45.94±5.70	42.92±4.88	3.02	0.001*
Trunk Fat (%)	47.31±5.22	46.13±5.23	1.18	0.135
Trunk Fat (Kg)	17.81±3.16	17.27±3.13	0.54	0.216

*statistically significant (p≤0.05)

Conclusion: The findings show that an interdisciplinary program, aimed at lifestyle changing, is effective in the management of patients with obesity, reducing the risk of developing the metabolic syndrome and symptoms of binge eating. However, despite what the results show us there is not a strong association between the symptoms of binge eating and predictors of metabolic syndrome, there is an influence on them and can contribute to obesity and, consequently, increase the risk of metabolic syndrome.

Session 1: Obesity

85-agZt-124

IMPACT OF A 12-WEEK SUPERVISED PHYSICAL ACTIVITY PROGRAM AFTER BARIATRIC SURGERY ON CARDIORESPIRATORY CAPACITY

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Bariatric surgery is an effective long-term treatment for the management of severe obesity. Weight loss induced by bariatric surgery is characterized by a greater reduction in fat than muscle mass. Severely obese patients have a reduced exercise capacity and are known to perform external work with higher energy expenditure. There is a lack of data regarding the effect of physical activity on the cardiorespiratory capacity after bariatric surgery. The purpose of this study was to measure the impact of bariatric surgery and the impact of a 12-week supervised physical activity program, between months 3 to 6 after bariatric surgery, on cardiorespiratory capacity. Patients were randomized either to a supervised physical activity program group (EG) or usual care (CG). Anthropometric measurements, abdominal and mid-thigh computed tomography scans and maximal exercise test were performed before and at 3 and 6 months after bariatric surgery (sleeve gastrectomy or biliopancreatic diversion with duodenal switch). Patients in the EG trained for 60 minutes (aerobic and resistance training), between months 3 to 6, at least thrice weekly. Up to now, 55 patients are enrolled. So far, 28 patients (EG=17, CG=11) have completed 6-month follow-up. At baseline, both groups were similar, with 68% female, maximal oxygen consumption (VO_{2peak}) of 15 ± 3.6 mL₂/kg/min, visceral adipose tissue volume of 2247 ± 849 cm³. At 3 months post-surgery, both groups were comparable and had similar VO_{2peak} (EG= 17.9 ± 4.8 , CG= 15.5 ± 3.0 mL₂/kg/min). After the exercise training period, between months 3 to 6, there was a trend toward greater improvement in VO_{2peak} in the EG ($p=0.197$). Maximal oxygen consumption improvement was determined by mobilization of the visceral adipose tissue ($R^2=0.65$; $\beta=-0.80$; $p=0.009$) and weight lost ($R^2=0.24$; $\beta=1.5$; $p=0.002$). In conclusion, exercise training post-bariatric surgery had favorable impacts on cardiorespiratory capacity. More patients are being studied to further delineate the parameters involved.

Session 1: Obesity

85-r28U-144

ANTHROPOMETRIC INDICATORS OF OBESITY FOR IDENTIFYING CARDIOMETABOLIC RISK FACTORS IN A RURAL MEXICAN POPULATION

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Objective: The aim of the present study was to evaluate the predictive ability of body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR) and body fat percentages (BF%) for the presence of metabolic syndrome (MS).

Methods: Through a random sampling probabilistic were selected 1934 adults ≥ 30 years with some cardiovascular risk factor. Trained personnel obtained anthropometric measures (weight, height and WC) and a fasting blood sample was collected to determine lipids profile and glucose levels. We evaluated the association between BMI (weight/height²), WC and BSI (WC/(BMI^{2/3}x height^{1/2}), and glucose, triglycerides, total cholesterol, HDL-Cholesterol and systolic and diastolic blood pressure. The indicators was divided in to quartiles (Q) and we computed a lineal regression models to compare the mean of MS components in different quartiles, adjusting for sex and age.

Results: The mean BMI was 28.3 kg/m² (women 28.8 kg/m² and men 27.0 kg/m²), WC was 94.8cm (94.9 cm women and 94.3 cm men); and BSI was 0.083 (0.083 women and 0.082 men). Compared quartile 4 (Q4) versus quartile 1 (Q1) of BMI and WC, we found statistically significant difference of triglycerides (BMI:42.2 mg/dl; WC: 43.8 mg/dl) , HDL-Cholesterol (BMI: -4.7 mg/dl; WC: -5.1 mg/dl), systolic blood pressure (BMI: 7.4 mmHg; WC: 7.5mmHg) and diastolic blood pressure (BMI: 8.4mmHg; WC: 7.8mmHg). For BSI there were no significant difference for this components but it was difference for glucose levels (14.1 mg/dl).

Conclusions: BMI and WC shows to be good indicator for risk of lipids and blood pressure but not for glucose, while BSI are more sensible for glucose but not for the other risk factor evaluated. Because this is a cross sectional study, the results are not conclusive. It is necessary more analysis to compare the sensibility and specificity of this indicators given some cardiovascular results.

Session 1: Physical Activity/Exercise

85-r28U-144

GEOGRAPHIC VARIATION OF LEISURE PHYSICAL ACTIVITY AMONG CANADIAN ADULTS*Benoit Lalonde¹, Ramona Fratu¹, Alexandre Lebel¹**¹Evaluation Platform on Obesity Prevention, Quebec Heart and Lung Institute*

Objectives: Exploring the geographic variation of leisure physical activity (LPA) among Canadian adults (20-65 years).

Methods: Data came from the Canadian Community Health Survey (CCHS) 2003 to 2011 (n=363 314). Three-level multilevel logistic regressions were used to analyse the geographic distribution of LPA. The outcome was a dichotomous variable of LPA indicating whether individuals achieved or not the recommended daily level for physical activity performed during leisure time. Sex stratified modelling considered individual attributes and contextual factors. The median odds ratio (MOR) with a 95% credible interval (CrI) was used to estimate the importance of the geographic variance of LPA. The deviance information criterion (DIC) was used to compare the models' goodness-of-fit. Mapping and Exploratory Spatial Data Analysis (ESDA) was used to analyse the geographic distribution of the third-level residuals. Estimated parameters for all variables were transformed into odds ratios (OR), with a 95% confidence interval.

Results: In the null model, the MOR reveals significant differences in LPA between health regions (HR) for women (MOR (95%CrI)=1.26 (1.22; 1.30)) and men (MOR (95%CrI)=1.32 (1.27; 1.38)). Lower deprivation, summer time and urban context were associated with LPA. Third-level residuals mapping was performed to identify HR, after considering individual and contextual factors, have a significantly higher or lower probability ($p < 0.05$) to achieving the recommended daily level for physical activity performed during leisure-time. Finally, the ESDA indicated significant autocorrelation in the spatial distribution of HR-level residuals for women (Moran's $I=0.39$; $p < 0.05$) and men (Moran's $I=0.56$; $p < 0.05$). Spatial autocorrelation in the HR-level residuals is suggesting the absence of an important variable related to a geographic phenomenon in the model.

Conclusions: This research shows significant geographic differences in LPA among Canadian adult. Despite the individuals' characteristics, contextual factor like weather, socioeconomic status and urbanization degree may influence physical activity levels. However, more research is required to understand the impact that environmental and socioeconomic context may have on Canadian adult PA.

Session 1: Physical Activity/Exercise

85-hLcE-293

THE RELATIONSHIP BETWEEN RISKY OUTDOOR PLAY AND HEALTH IN CHILDREN A SYSTEMATIC REVIEW*Guylaine Chabot¹, Mariana Brussoni², Casey Gray³, Mark Tremblay⁴*¹CRIUCPQ²Department of Pediatrics, School of Population & Public Health, British Columbia Injury Research³Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research⁴Department of Pediatrics, Children's Hospital of Eastern Ontario Research Institute

Objectives: Societal drift towards “bubble-wrapping” our children, coupled with an inherent parental fear of any risk and related litigation have raised concerns regarding the potential adverse health outcomes from limiting children’s access to risky outdoor play opportunities. The objective of this systematic review was to investigate the relationship between risky outdoor play and health indicators in children aged 3-12 years.

Methods: A systematic search of electronic databases yielded 2111 records on risky play behaviours and supportive environments. Supplemental searches were conducted to target independent mobility and rough-and-tumble play. Papers were excluded if the behaviour did not occur outdoors, if it was structured/organized sport, and if it was risky substances or sexual behaviours. The evidence from included studies was grouped by type of risky play and subdivided by health indicator. Risk of bias for individual papers was examined in line with the Cochrane Handbook. The GRADE framework was used to assess the quality of evidence from this review. Heterogeneity of data prevented meta-analysis and data were described using narrative synthesis.

Results: Eighteen eligible studies (21 papers) were identified from 8 countries, with a cumulative sample of ~50,015 participants. The final sample included 7 studies where children can disappear/get lost, 1 study involving great heights, 5 studies of rough-and-tumble play, and 5 studies of play supportive environments. The systematic review revealed overall positive effects of risky outdoor play on a variety of health indicators, most commonly physical activity, but also sedentary behaviour, social health and behaviours, injuries, and aggression. Included studies were largely cross-sectional. The review indicated the need for additional “good quality” studies.

Conclusions: The positive results stemming from this review, the compelling multi-disciplinary evidence that was excluded from this review, as well as precedents from some European nations, indicate the need to encourage immediate action to support children’s risky outdoor play opportunities.

Session 1: Physical Activity/Exercise

85-bbAN-104

PHYSICAL ACTIVITY MEASURED BY ACCELEROMETRY IN TODDLERS – CORRELATES AND COMPARISON WITH CANADIAN GUIDELINES*Isabelle Marc¹, Florence Tremblay¹, Michèle Bisson¹**¹CHU de Québec*

Objectives: Physical activity is important for children's growth and development, but it has been poorly studied in young children. The objectives of this study were to document physical activity levels in a sample of 2 year olds, compare these levels to the actual recommendations (180 min per day of physical activity of any intensity) and identify correlates of physical activity in toddlers.

Methods: Toddlers' physical activity and sedentary time were measured using accelerometry and questionnaire (Pre-PAQ). Parents completed the questionnaire and children had to wear accelerometers for 7 days. Trost's cut point for 2-year-old children was used to quantify physical activity intensity.

Results: Preliminary data were available in 39 toddlers (51% boys, 2.1 ± 0.1 years). Of those, 33 completed questionnaires. Boys and girls were similar with respect to age, BMI, height and weight. Based on accelerometry data and compared with girls, boys spent more time doing activity of moderate and vigorous intensity (70.2 ± 26.5 min per day vs 53.8 ± 22.0 min per day, $p < 0.05$) and accumulated more steps per day (6439 ± 1267 steps vs 5338 ± 1299 steps, $p < 0.05$). Time spent doing physical activity of any intensity was 274.9 ± 55.7 min per day, and 95% of toddlers met current recommendations. Total active time and sedentary time did not differ between boys and girls. Physical activity levels were positively correlated with toddlers' height ($r = 0.51$, $p = 0.022$) and weight ($r = 0.58$, $p = 0.008$) in boys but not in girls. BMI and having siblings did not influence physical activity levels. Moderate to vigorous physical activity as reported by parents was moderately correlated with number of steps per day ($r = 0.38$, $p = 0.03$) and number of counts per day ($r = 0.34$, $p = 0.05$), as objectively measured by accelerometry.

Conclusions: A majority of toddlers meet current physical activity recommendations, based on accelerometry data. Even at this young age, boys are more active than girls, and physical activity levels appear to be related with physical growth in boys, but not in girls.

Session 1: Physical Activity/Exercise

85-W32V-174

LEISURE-TIME VS. OCCUPATIONAL PHYSICAL ACTIVITY AND CARDIORESPIRATORY FITNESS ASSESSED AT THE WORKPLACE

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Objectives: To examine the association between occupational vs. leisure-time physical activity and cardiorespiratory fitness assessed in a workplace health and wellness program.

Methods: Employees (n=3117) from different companies (mostly blue collar workers) were recruited through the "Grand Défi Entreprise", a lifestyle modification program designed for the workplace using a mobile Cardiometabolic risk assessment unit. The evaluation included lifestyle questionnaire, resting blood pressure, blood sampling, anthropometric measurements and submaximal treadmill test. Level of occupational and leisure-time physical activity was self-reported by the participants using a validated questionnaire from the EPIC-Norfolk study.

Results: Men (n=2363) and non-menopausal women (n=754) were first classified as a function of their level of occupational physical activity (Very demanding work (VDW), physically active work (PAW), standing work (STW) and sedentary work (SW)). The results showed that VDW men were not significantly different from SW men for their level of cardiorespiratory fitness (CRF), anthropometric and cardiometabolic risk profile, as well as for their lifestyle habits (nutritional quality (NQ) and physical activity level). Similar results were observed among non-menopausal women. On the other hand, when stratified on the basis of their leisure-time physical activity level (active, moderately active, moderately inactive, inactive), active men (≥ 60 minutes of physical activity/day) showed a greater CRF level ($p < 0.001$) than inactive men (0 minute/day). Active men also presented a significantly lower waist circumference (94.3 ± 11.1 vs. 101.4 ± 14.1 cm, $p < 0.001$) and a lower body mass index (26.9 ± 3.8 vs. 28.9 ± 5.2 kg/m², $p < 0.001$), as well as a better overall cardiometabolic risk profile (triglycerides 2.00 ± 1.16 vs. 2.21 ± 1.24 mmol/l, $p < 0.05$ and total Chol/HDL-Chol ratio 3.83 ± 1.08 vs. 4.08 ± 1.36 , $p < 0.001$) and a healthier NQ index (63.7 ± 13.1 vs. 51.4 ± 11.8 , $p < 0.001$) than inactive men during their leisure time. Active non-menopausal women in their leisure-time were also significantly different from inactive women, showing differences in CRF ($p < 0.05$), anthropometric variables ($p < 0.05$), cardiometabolic risk profile ($p < 0.05$) and NQ ($p < 0.0001$).

Conclusions: Level of physical activity at work was not found to be related with CRF whereas level of physical activity during leisure time was significantly related to CRF, adiposity indices, cardiometabolic risk profile and nutritional quality.

Session 1: Population Health

85-MdK8-183

THE MODERATING EFFECT OF SOCIOECONOMIC STATUS ON THE SHORT-TERM IMPACT OF THE WIXX MULTIMEDIA COMMUNICATION CAMPAIGN ON CHILDREN'S PHYSICAL ACTIVITY

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Objectives: The aim of this study was to examine the impact of the WIXX campaign on children's self-reported physical activity (PA) during the first year of campaign implementation according to socioeconomic status (SES).

Methods: This study adopted a repeated post-test design. A cross-sectional population-based telephone survey was conducted nine months after the launch of the campaign in September 2012 in the Province of Québec, Canada. A random digit-dialing procedure was used to recruit 1001 families with a child aged 9 to 13 years. The first year core components of the campaign included paid advertisements, community-based activities, and the development of local partnerships. Three separate websites were developed to reach children, parents, and practitioners. Family annual income (median): <60,000\$Can [1] versus ≥60,000\$Can [0]) and parental level of education (High school or less [1] versus college/university [0]) served as SES variables. Interaction terms were created between SES variables and exposure to the WIXX advertising campaign (unaided/aided recall [1] versus no/other recall [0]). Recall and PA were self-reported by the children and SES was reported by the responding parent. Analyses were stratified by sex and the moderating effect of SES was examined using logistic regression analyses.

Results: Among girls, those who recalled the campaign and lived in families with a lower annual income were significantly more likely to meet the Canadian PA recommendations for children (OR=3.1; 95%CI: 1.4, 6.8) compared to those not recalling the campaign in the same income category and to those living in families with higher family annual income. Among boys, a trend was observed for education (p=.07): those who recalled the campaign and whose responding parent had a lower level of education were more likely to meet PA recommendations (OR=2.7; 95%CI: 0.9, 7.8) compared to the boys not recalling the campaign in the same education category and to those living in families with higher levels of education. No other statistically significant interaction effects were observed.

Conclusions: Exposure to the WIXX campaign was associated with greater participation in PA among girls living in families with an annual income below the population median. No evidence for increasing inequalities was observed.

Session 1: Population Health

85-dXud-263

EFFICACY OF INTERVENTIONS AIMING TO DECREASE CONSUMPTION OF SUGARY DRINKS AMONG TEENAGERS: RESEARCH PROTOCOL FOR A SYSTEMATIC REVIEW AND META-ANALYSIS

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Objectives: The World Health Organization has recently urged people to decrease their sugar consumption, including sugary drinks, in order to decrease health problems such as obesity. The objective of this systematic review/meta-analysis is to evaluate the efficacy of interventions aimed at decreasing sugary drinks consumption among teenagers aged from 12 to 17.

Methods: A systematic review of experimental, quasi-experimental, and pre-post studies will be performed based on the Cochrane Handbook methodological recommendations. We will systematically search main health sciences databases such as PubMed, Embase, CINAHL, Cochrane Library, Embase, PsycINFO, as well as grey literature (e.g., ProQuest Dissertations and Theses) and reference lists of included studies. Studies among teenagers reporting intervention results that can be converted into effect sizes will be eligible for inclusion. Data will be collected on participants and study characteristics (e.g., country, baseline demographics, design, sample size, response rate, theoretical framework, and methodological quality), intervention details (e.g., setting, content, duration, variables targeted), measure of sugary drinks consumption and intervention results. Interventions' components will be classified according to an adapted version of Cane's (2015) taxonomy of behavior change techniques. Two independent reviewers will screen references, extract data using a standardized data extraction form and assess study quality with modified versions of The Cochrane Collaboration Tool. Data will be pooled as standard mean differences using random-effect models with inverse variance methods in Review Manager (v5.3). Pooled effect sizes and their 95% confidence intervals will be reported. Statistical heterogeneity will be assessed using the Cochran's Q-test and I^2 statistic. Risk of publication bias will be performed by visual examination of funnel plots. Sensitivity and subgroup analyses will be executed according to sex, type of sugary drink, and risk of bias.

Results: The results will be reported according to the PRISMA guideline in peer-reviewed journals and conferences, and they will also be published in summary reports on public health organization websites.

Conclusions: This systematic review/meta-analysis will allow identification of the most promising strategies to successfully decrease sugary drinks consumption among teenagers. This information will be helpful for adjusting existing interventions or developing innovative programs to prevent obesity and related diseases.

Session 1: Population Health

85-g5S6-283

THE UNTOLD STORY OF BMI VARIATION AMONG CANADIAN ADULTS

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Objectives: There are well-documented increases in mean Body Mass Index (BMI) and prevalence of obesity during the last decades in Canada. Associations between weight and socioeconomic status are not always consistent between studies. More recently, some studies suggested a slowdown in BMI progression. Previous analyses, however, reported limited information whether the evolution of BMI is shared equally across populations and regions. The main objective of our study is to describe changes in BMI across all segments of the BMI distribution stratified by education level separately for women and men.

Methods: We used the Canadian Community Health Survey (CCHS, 2001-2012), to compute BMI of adults women and men (n= 429,104) comprised between 25 and 65 years old. Quantile-Quantile plots were used to explore the evolution of the BMI percentiles between cycles, sex, education, and regions.

Results: Results showed a majority of groups increased in mean BMI, and BMI values at 95th percentiles over time. Much larger changes in BMI values were observed at the 95th percentile. Important differences were found according to sex, education level and provinces. The rise at 95th percentile was sometime larger among adults with the highest education level than less educated people from the same province.

Conclusion: This suggests that the population weight gain is occurring more importantly among those with already high baseline BMI levels. Since this effect may vary a lot according to place and education level, studies that characterize population change should examine patterns of change across the entire distribution and not just global average trends.

Session 1: Population Health

85-gJ9C-293

TWELVE YEARS OF SOCIAL AND GEOGRAPHIC DISTRIBUTION OF BMI AMONG CANADIAN ADULTS*Nathalie Dumas¹, Ramona Fratu¹, Patricia Lamontagne², Alexandre Lebel¹**¹Evaluation Platform on Obesity Prevention at Quebec Heart and Lung University Institute**²Institut national de santé publique du Québec*

Objectives: Although non-communicable diseases have a complex etiology, monitoring trends among subgroups of the population remains useful for stakeholders. In this paper we studied the evolution of twelve years of BMI among Canadian adults between regions by sex according to socioeconomic status (SES).

Methods: We used the Canadian Community Health Survey, a repeated cross-sectional survey administrated between 2000 and 2012 to adults aged from 25 to 64 years. (N = 429,104) in the ten Canadian provinces. We used residuals issued from an age-adjusted linear regression to examine the BMI evolution at every point of the distribution over time. Ordinary least squares (OLS) regression model, with age as adjustment covariate was achieved. The analysis; followed by the addition of the grand mean to residuals from this model. Quantile-quantile (QQ) plots were constructed by plotting percentile of BMI from the most recent survey to the baseline. We further identified percentile changes in time for each subgroup to reach threshold of overweight and obesity. We used the education level as SES indicator.

Results: Taken globally, BMI of Canadians increased regularly for everyone. However, this change was not uniform. Globally, men had higher mean BMI than women, while mean BMI increased for both at a similar rate. We were able to demonstrate greater variance when stratified by province and by SES indicator. For instance the temporal change of percentile to reach the threshold for obesity for women from Atlantic is four times faster than those from BC. Whereas men with a university degree in Ontario, even if they maintain their position as the group with lowest BMI during the six cycles, they reached the threshold for overweight and obesity three times faster than citizens without a high school degree.

Conclusions: These results suggest important variations in the BMI evolution among sub-groups of population. Our information' could help community stakeholders to elaborate evidence-based initiatives. Even if we found differences in the BMI distribution by province, sex and SES, one point remains after twelve years: BMI is growing up, and the highest the BMI, the fastest the growth!

Session 1: Prevention

85-sNXW-124

INFLUENCE OF CLASSICAL RISK FACTORS ON CAROTID TOTAL PLAQUE AREA PROGRESSION

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Objective: To determine the influence of cardiovascular risk factors on carotid total plaque area progression.

Methods: Data were obtained from the patient database of Blossom DMO, a primary prevention program in Córdoba, Argentina, from 2004 until present. The database includes 4,351 patients in total, composed of 2659 men, 2163 hypertensive patients, 877 diabetics, 2433 active smokers, 1315 individuals with family history of early cardiovascular disease (CVD) and 3726 with BMI >25 kg/m². During each follow-up visit, risk factor information was obtained and current Framingham risk score based on BMI was determined. In addition, at each visit duplex ultrasound was used to measure carotid total plaque area (TPA), a highly sensitive measure of subclinical atherosclerosis that effectively predicts future CVD risk. To determine the influence of cardiovascular risk factors on the carotid total plaque area progression, we fitted a generalized linear model using TPA as the response variable with gamma distribution and log link function, age as a continuous variable, and all other variables as explicative factors in the linear predictor.

Results: The adjusted model showed that TPA progressed at a rate of 1.02 ± 1.08 cm²/year in patients with no risk factors. In diabetic patients, TPA progression was 1.22 ± 1.05 cm²/year; in smokers, 1.34 ± 1.04 cm²/year; and in hypertension, 1.57 ± 1.04 cm²/year. In the presence of a family history of early CVD, TPA progression was 1.08 ± 1.06 cm²/year. BMI alone did not influence TPA progression. Further, there was significant interaction among the risk factors, namely hypertension & diabetes, hypertension & smoking, and diabetes & smoking, suggesting a multiplicative effect rather than an additive one.

Conclusions: Our data indicate that TPA progression is significantly determined by age, diabetes, smoking, family history of early CVD, and hypertension, and that the presence of at least two concurrent classical risk factors potentiates TPA growth. Therefore, determination of TPA in patients with intermediate Framingham risk may be required to better stratify the risk of these patients and treat accordingly.

Session 2: Abdominal Obesity/Body Fat Distribution

85-voR3-253

NECK CIRCUMFERENCE AND INCIDENCE OF DIABETES MELLITUS OVER 10 YEARS IN THE KOREAN GENOME AND EPIDEMIOLOGY STUDY (KOGES)

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Neck circumference, a proxy for upper-body fat, may be a unique fat depot that indicates metabolic risk beyond whole body fat. We investigated whether neck circumference is associated with development of diabetes mellitus (DM) in a subset of data with Korean Genome and Epidemiology Study (n=3521, age range=42-71 years). Nondiabetic subjects at the baseline were categorized into 4 groups (Q1-Q4) according to their neck circumference. Parameters related with β -cell function and insulin resistance including Epworth sleepiness scale and snoring habit were examined. The development of DM was confirmed biannually based on a 75-g oral glucose tolerance test. Over the 10 years, 2623 (74.5%) among 3521 subjects were followed-up. Among them, 632 (24.1%) developed DM. The incidence of DM increased from 17.6% in Q1 to 18.2% in Q2, to 25.4% in Q3, and to 36.0% in Q4 ($P<0.001$). After adjusting for most risk factors related with DM, the relative risks of DM development were 0.95 (95% confidence interval, 0.66-1.37), 1.50 (1.02-2.22), and 1.63 (1.07-2.50) in Q2, Q3, and Q4, respectively when compared to Q1. This finding indicates negative impact from large neck circumference in the development of DM beyond whole body fat and other risk factors.

Session 2: Abdominal Obesity/Body Fat Distribution

85-vqQu-124

VISCERAL ADIPOSITY AND CARDIOMETABOLIC RISK PROFIL EVALUATION IN PATIENTS WITH COPD: PRELIMINARY RESULTS FROM A CANCOLD SUBSTUDY

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Objectives: To analyze body fat distribution and cardiometabolic risk profile in a subgroup of subjects enrolled in the Canadian Cohort of Obstructive Lung Disease (CanCOLD).

Methods: This interim analysis from a CanCOLD substudy still in progress included 144 subjects (88 males; age = 64 ± 9 years). Subjects were divided according to the Global Obstructive Lung Disease Initiative (GOLD) airflow limitation severity classification (controls: n = 66; GOLD 1: n = 34; GOLD 2-3: n = 44). In addition to clinical data, cross-sectional areas of abdominal visceral and subcutaneous adipose tissue (AT) and of muscle as well as mean attenuation of these tissues were assessed with a single abdominal CT scan performed at the level of L4-L5. A fasting cardiometabolic risk profile was also obtained (AST, ALT, GGT, glucose, insulin, total cholesterol, LDL-cholesterol, HDL-cholesterol, apolipoprotein B, triglycerides, high-sensitivity C-reactive protein [hsCRP], leptin, ghrelin, resistin) on all patients.

Results: There were no statistically significant between-group differences for age, gender distribution and waist circumference. However, GOLD 2-3 patients have a significantly higher BMI than Controls and GOLD 1 patients. The mean cross-sectional area of visceral AT was significantly higher in GOLD 2-3 patients (235 ± 114cm²) in comparison to GOLD 1 (141 ± 79cm²; p <0.001). In addition, the area of subcutaneous AT was different between groups and was higher in GOLD 2-3 patients. The mean attenuation of visceral AT (-92 ± 8 HU) and muscle tissue (33 ± 8 HU) was different between group. GOLD 2-3 patients have significantly lower muscle attenuation in comparison to GOLD 1 individuals, a reflection of tissue lipid accumulation in the former group. Blood lipid and inflammatory profiles were not different between groups although leptin tended to be higher for GOLD 2-3 individuals (17.4 ± 20.2ng/mL) compared to GOLD 1 (7.3 ± 5.7ng/mL; p=0.06).

Conclusions: GOLD 2-3 patients appear to have higher BMI, visceral and subcutaneous AT than controls and GOLD 1. These findings provide plausible mechanism for the increased cardiovascular risk in patients with moderate to severe COPD.

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Session 2: Abdominal Obesity/Body Fat Distribution

85-cpgB-124

LIPID ACCUMULATION PRODUCT AS A SURROGATE MARKER OF INSULIN RESISTANCE IN ADOLESCENTS - BRAZILIAN METABOLIC SYNDROME STUDY (BRAMS)

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Objectives: Lipid accumulation product (LAP) is an index, based on combination of waist circumference (WC) and fasting triglyceride (TG) reflecting central lipid accumulation. Studies with adults demonstrated that an increased LAP value is associated with insulin resistance (IR). The usefulness of LAP as marker of IR in adolescents however remains unknown. The aims of this study were to investigate the ability of LAP to identify IR in adolescents and to assess whether LAP was superior to BMI z-score (zBMI) in identifying IR.

Methods: This is a cross-sectional study carried out with 835 adolescents (489 females; 10-19.9 years old; Tanner stages II-V). A subsample from the whole group of 76 adolescents (38 females) underwent the hyperglycemic clamp. WC (mid-point between the lowest rib and the iliac crest) and body composition (bioimpedance) were measured. LAP was defined as: $(WC_{[cm]} - 65) \times (TG_{[mmol/L]})$ for males, and $(WC_{[cm]} - 58) \times (TG_{[mmol/L]})$ for females. IR was evaluated using the HOMA-IR and glucose infusion rate adjusted for free fat mass (GIR_{FFM}) obtained in the clamp. In total sample and in the subsample, respectively, adolescents were considered with increased LAP if they were ≥ 75 th percentile (males: ≥ 46.7 , females: ≥ 43.5 , and males: ≥ 42.1 , females ≥ 51.4); with increased zBMI if they were ≥ 85 th percentile; and considered with IR if they were ≥ 75 th percentile of HOMA-IR (males: ≥ 3.90 ; females ≥ 4.19) and if they were ≤ 25 th percentile for GIR_{FFM} (males: ≥ 0.10 ; females ≥ 0.11). Statistical analysis: correlation coefficient and ANCOVA adjusted for age and pubertal stage, ROC analysis.

Results: In males e females, respectively, LAP and zBMI showed significant correlations with IR measured by clamp ($r = -0.58$ vs -0.68 , and -0.65 vs -0.75), and by HOMA-IR ($r = 0.62$ vs 0.54 , and 0.51 vs 0.42), respectively. LAP and zBMI, respectively, exhibited good performance in identifying IR in males (clamp AUC: 0.811 and 0.816, and HOMA-IR AUC: 0.827 and 0.831), and in females (clamp AUC: 0.916 and 0.839, and HOMA-IR AUC: 0.791 and 0.781). All $p < 0.001$. ANCOVA showed that both females and males with LAP and zBMI increased not differ from those with LAP normal and zBMI increased in identifying IR.

Conclusions: LAP showed good accuracy for diagnosing IR in Brazilian adolescents. In both genders, the performance of the LAP was similar to the zBMI, in identifying IR.

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Session 2: Adipokines

85-VDPy-293

MODULATORS OF PROSTAGLANDIN RELEASE BY VISCERAL AND SUBCUTANEOUS ADIPOSE TISSUE EXPLANTS IN WOMEN

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Introduction: Prostaglandins (PGs) are lipid mediators involved in the regulation of inflammation and adipogenesis. Our recent findings demonstrated that AKR1B1 may have a predominant role in PGF_{2α} synthesis by human preadipocytes in response to inflammatory cytokines. Further studies are needed to understand depot-specific modulation of prostaglandin secretion by abdominal adipose tissues.

Objective: To examine depot-specific PGE₂ and PGF_{2α} release by human subcutaneous (SC) and omental (OM) adipose tissue explants in response to the aldose reductase (AKR1B1) inhibitor ponalrestat and the cyclooxygenase (COX)-2 selective inhibitor NS-398. Methods: Adipose tissue samples were obtained by surgery in obese women (n=10) and were used to initiate explant cultures. This model has the advantage of including all cell types contained in adipose tissue. The PGE₂ and PGF_{2α} response of explants was assessed by incubating tissues with IL-1β (1ng/ml) or vehicle in the presence or absence of the AKR1B1 inhibitor ponalrestat (10μM) or the COX-2 inhibitor NS-398 (1μM) for 24 hours. PGE₂ and PGF_{2α} content in the media was measured by enzyme immunoassay and acetylcholinesterase-linked PGE₂ and PGF_{2α} tracer.

Results: PGE₂ and PGF_{2α} release was induced in response to IL-1β compared to control in OM explants (p=0.001 and p=0.0001, respectively) and to a lesser extent in SC explants (p≤0.01 for both). Explants from OM fat released more PGE₂ than those from the SC depot in response to vehicle and IL-1β (p≤0.05 for both). As expected, the COX-2 inhibitor significantly reduced PGE₂ and PGF_{2α} synthesis by tissue explants in basal and IL-1β-stimulated conditions (p≤0.01 for all). When incubated in the presence of the AKR1B1 inhibitor, most of the PGF_{2α} release was inhibited (p≤0.002). Much like in other cell types such as endometrial cells, the release of PGE₂ was also blocked by this inhibitor (p≤0.02).

Conclusions: Tissue explants from the OM fat compartment release more PGE₂ than those from the SC depot. IL-1β is a strong stimulator of PGE₂ and PGF_{2α} release especially in adipose tissue explants of the OM fat compartment. Blocking PGF synthase AKR1B1 inhibits most of the release of PGF_{2α} as well as PGE₂ by tissue explants from both fat compartments.

Session 2: Adipose Tissue

85-FNNU-123

CHARACTERIZATION OF 5 α -REDUCTASE ACTIVITY AND ISOENZYMES IN HUMAN ABDOMINAL ADIPOSE TISSUES*Mohamed Mansour¹, Melissa Pelletier¹, Andre Tchernof²**¹Endocrinology and Nephrology, CHU de Québec Medical Center, Québec, Canada**²Québec Heart and Lung Institute Research Center, Laval University, Québec, Canada*

The substrate for the generation of 5 α -dihydrotestosterone (DHT) is either androstenedione (4-dione) which is first converted to androstenedione and then to DHT through 17-oxoreductase activity, or testosterone which is directly converted to DHT. Three 5 α -reductase isoenzymes have been characterized and designated as types 1, 2 and 3.

Objective: To define the predominant local source of DHT production and identify 5 α -reductase isoenzymes in human abdominal adipose tissues.

Methods: We measured mRNA expression of SRD5A isoenzymes in whole omental (OM) and subcutaneous (SC) adipose tissue samples (n=20) as well as in OM (n=5) and SC (n=7) primary preadipocytes before and after differentiation. Cultures of OM (n=4) and SC (n=5) preadipocytes were treated for 0, 6 or 24h with 30 nM of ¹⁴C-4-dione or ¹⁴C-testosterone, with and without 500nM 5 α -reductase inhibitors 17-N,N-diethylcarbamoyl-4-methyl-4-aza-5-androstan-3-one (4-MA) or finasteride. HEK-293 cells stably transfected with 5 α -reductase type 1, 2 or 3 were used to test these inhibitors.

Results: In whole adipose tissue from both fat compartments, SRD5A3 was the most highly expressed isoenzyme followed by SRD5A1 (p<0.001). SRD5A2 was not expressed. SRD5A1 and SRD5A3 mRNA abundance was slightly increased upon preadipocyte differentiation although it did not reach significance. Over a 24-h time course, DHT formation from 4-dione increased gradually (p<0.05) and was significantly higher compared to that generated from testosterone (p<0.001). In HEK-293 cells, 4-MA and finasteride inhibited activity of 5 α -reductases type 2 and type 3 but not type 1. DHT formation from both 4-dione and testosterone was blocked by both inhibitors.

Conclusion: 4-dione is the main local source of DHT in human preadipocytes. Messenger RNA of SRD5A1 and 3 are detected and SRD5A3 is the most highly expressed isoenzyme in adipose tissue.

Session 2: Cardiometabolic Risk

85-et3U-263

THE WORLDWIDE BURDEN OF CARDIOMETABOLIC SYNDROME IN CHILDHOOD. STRATEGIES TO PREVENT*Andreas Petropoulos¹, Peter Fritsch¹, Renate Oberhoffer¹**¹AEPC w.g Prevention Cardiology*

Objectives: 1. Describe the worldwide burden of cardio metabolic syndrome CMS in childhood. 2. Its link with accelerating presentations of cardiovascular disease CVD in early adulthood. 3. Present the existing measures which have recently introduced by research on CMS prevention. 4. Comment on the reluctance of the medical community and contemporary society in adopting them.

Methods: Combination of systematic review of literature since 2003, clinical observations, imaging, post-mortem histological evidence, consensus from bodies of excellence.

Results: 1. CMS prevalence worldwide is estimated to be 3.3% in normal weight children. This rises to 11.9% in overweight and 29.2% in obese children. Higher CMS prevalence for boys compared to girls 5.1/3.0%. Also in older compared with younger 5.6%/ 2.9% is described.

2. Preliminary prospective studies report CMS in childhood provokes high risk of developing CVD and diabetes as adults. CMS among youth is fueled by the increasing prevalence of obesity in this group. Furthermore, CMS has been found to cluster several non-traditional risk factors for CVD.

3. American Heart Association and American Academy of Pediatrics have published in 2011 guidelines that address all common risk factors for CVD, CMS and describe specific strategies for prevention.

4. As the prevalence of traditional and non risk factors for CVD increases, in addition to mortality and morbidity from these diseases, it is clear that the existing preventive and therapeutical measures are failing worldwide. A combination of reluctance from the medical community, to adopt these measures and negligence of both civic and state society to enhance a healthier life style are the principal reasons of this underachievement.

Conclusions: The prevalence of CMS in childhood is a primary contributor of sustaining the high mortality and morbidity from CVD worldwide.

Session 2: Cardiometabolic Risk

85-aVj2-293

INFLUENCE OF VO₂MAX AT BASELINE ON THE EFFECTS OF A MULTIDISCIPLINARY INTERVENTION ON METABOLIC SYNDROME RISK FACTORS IN OBESE ADOLESCENTS

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Objective: Assess the influence of VO₂max at baseline on the effects of a multidisciplinary intervention on metabolic syndrome risk factors in obese adolescents.

Methods: Forty-four adolescents (44 girls) aged between 10 and 18 years were allocated in higher VO₂max group (n=21; 11 girls) and lower VO₂max group (n=23; 16 girls) according to the 50th percentile (median) of VO₂max at baseline on the own sample. Adolescents engaged on a 16-weeks multidisciplinary program for obesity treatment (PMTO) focused on changing exercise and eating behaviors based on Cognitive Behavioral Therapy. The PMTO team is composed by physical educators, a cognitive-behavioral psychologist, a nutritionist and a pediatrician. The interventions happened three times per week (Mondays, Wednesdays and Fridays) with an 1-hour group meeting with the different health professionals more 1-hour physical exercise training. Anthropometric measures, body composition, lipid profile, and metabolic syndrome risk factors (abdominal obesity, HDL-c, triglycerides, glycemia and blood pressure) were evaluated before and after the intervention based on stardardized procedures. We used Shapiro-Wilk test for assessing normality. Based on that, data were presented as median (range) and non-parametric Wilcoxon test was used to compared pre- and post-intervention. Significance was set at P<0.05.

Results:

Table 1. Impact of VO₂max at baseline on the effects of the PMTO on body composition and metabolic syndrome risk factors.

Variables	Higher VO ₂ max at baseline (n=21)			Lower VO ₂ max at baseline (n=23)		
	Baseline	Post-16 weeks	P	Baseline	Post-16 weeks	P
Body weight (kg)	79.4 (64.8-109.9)	79.4 (63.8-101.8)	0.821	84.0 (48.3-114.2)	81.9 (46.5-113.7)	0.659
BMI z-score	3.36 (2.40-4.90)	3.14 (2.10-5.00)	0.004*	3.69 (2.30-11.30)	3.66 (1.80-11.10)	0.048*
VO ₂ max (mL/kg/min)	23.8 (23.0-39.5)	25.5 (21.3-43.3)	0.048*	20.9 (18.0-22.6)	23.0 (18.5-28.8)	<0.001*
Body fat (%)	47.8 (23.5-55.3)	46.2 (16.5-53.5)	0.001*	52.2 (43.5-58.4)	49.4 (39.8-56.7)	<0.001*
Lean mass (kg)	38.6 (30.4-59.8)	41.3 (33.0-58.4)	0.026*	38.1 (23.2-53.7)	39.9 (23.9-53.3)	<0.001*
Glycemia (mg/dL)	90.0 (74.0-107.0)	89.0 (78.0-112.0)	0.840	86.0 (66.0-101.0)	87.0 (70.0-109.0)	0.772
Insulin (mg/dL)	17.0 (4.5-41.0)	13.4 (6.5-27.8)	0.024*	19.5 (5.8-32.8)	17.7 (5.1-64.8)	0.867
HOMA-IR	3.7 (0.8-9.4)	2.9 (1.3-6.7)	0.040*	4.2 (0.9-7.9)	3.5 (0.9-13.6)	0.702
QUICKI	0.315 (0.279-0.395)	0.325 (0.291-0.367)	0.073	0.309 (0.285-0.387)	0.318 (0.267-0.392)	0.935
TC (mg/dL)	151.0 (114.0-128.0)	147.0 (114.0-218.0)	0.173	157.0 (100.0-220.0)	154.0 (102.0-219.0)	0.148
TG (mg/dL)	105.0 (51.0-199.0)	84.0 (40.0-383.0)	0.639	117.0 (58.0-209.0)	96.0 (44.0-234.0)	0.091
LDL-c (mg/dL)	89.6 (33.2-136.0)	82.4 (54.0-141.0)	0.728	93.0 (36.4-126.6)	85.6 (34.4-148.2)	0.315
HDL-c (mg/dL)	49.0 (35.0-60.0)	42.0 (35.0-62.0)	0.154	42.0 (35.0-71.0)	44.0 (35.0-69.0)	0.614
VLDL-c (mg/dL)	21.0 (10.2-39.8)	17.8 (8.0-76.6)	0.689	22.4 (11.6-41.8)	19.6 (8.8-46.8)	0.241
SBP (mm/Hg)	120.0 (107.0-164.0)	115.0 (103.0-129.0)	0.044*	122.0 (99.0-150.0)	119.0 (107.0-136.0)	0.193
DBP (mm/Hg)	73.0 (57.0-90.0)	71.0 (57.0-81.0)	0.099	75.0 (62.0-100.0)	70.0 (59.0-86.0)	0.022*
WC (cm)	93.0 (75.0-102.0)	88.0 (74.5-99.0)	<0.001*	90.5 (74.5-122.0)	88.3 (70.8-125.0)	0.006*
Risk Factors MS (n)	2 (0-4)	1 (0-2)	0.027*	2 (0-5)	1 (0-5)	0.063

Data presented as median (range). *Significant difference from the baseline within group. BMI = Body Mass Index; VO₂max = Maximal Oxygen Uptake; HOMA-IR = Homeostasis Model Assessment Insulin-resistance Index (HOMA-IR); QUICKI = Quantitative Insulin Sensibility Check Index; TC = Total Cholesterol; TG = triglycerides; LDL-c = Low Density Lipoprotein cholesterol; HDL-c = High Density Lipoprotein cholesterol; VLDL-c = Very Low Density Lipoprotein cholesterol; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; WC = Waist Circumference; Dyslip = Dyslipidemia; MS = Metabolic Syndrome.

Conclusions: We concluded that adolescents who started the intervention protocol with higher VO₂max presented greater results for insulin resistance, systolic blood pressure and number of risk factors for metabolic syndrome than their counterparts with lower VO₂max at baseline, showing that reduced cardiorespiratory fitness may negatively influence the effects of a PMTO.

Session 2: Cardiometabolic Risk

85-apNs-74

ADDITION OF CARDIORESPIRATORY FITNESS WITHIN AN OBESITY RISK CLASSIFICATION MODEL IDENTIFIES MEN AT INCREASED RISK OF ALL-CAUSE MORTALITY

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Objective: Health organisations worldwide recommend the classification of body mass index (BMI) and waist circumference (WC) in combination to estimate disease risk. Cardiorespiratory fitness (CRF) is an established predictor of morbidity and mortality independent of both BMI and WC. However, CRF assessment is not recommended within the current risk classification model. We investigated whether addition of CRF, within the BMI/WC classification model, better predicted risk of all-cause mortality.

Methods: The study cohort consisted of 31,267 men from the Aerobics Center Longitudinal Study (ACLS). Participants completed a baseline medical examination at the Cooper Clinic in Dallas, Texas during 1970-2002. Participants were grouped according to BMI-specific WC thresholds (See Table 1). Participants were designated as unfit (lowest 20%) or fit (highest 80%) according to age-specified maximal exercise test time on treadmill among the entire ACLS population. Cox regression was used to estimate hazard ratios and 95% confidence intervals of all-cause mortality between fit and unfit individuals within each BMI/WC group.

Results: Participants were middle-aged (mean ± SD, 43.9 ± 9.4 years), overweight (BMI 26.2 ± 3.1 kg/m²), with a WC of 92.7 ± 9.5 cm and CRF of 12.1 ± 2.4 METs. Average length of follow-up was 14.1 ± 7.4 years. Hazard ratios of all-cause mortality between fit and unfit individuals within the BMI/WC groups are presented in Table 1. Mortality risk for unfit vs. fit participants was significantly higher in four of six BMI/WC groups.

Conclusion: Addition of CRF within current BMI/WC classifications significantly identified higher mortality risk in men. Although additional work is needed to establish CRF threshold values, this research further supports the measurement of CRF to improve patient risk management in healthcare settings.

Table 1. Hazard ratios for all-cause mortality between unfit and fit men within body mass index/waist circumference groups¹.

BMI	WC	Unfit	Fit	p-value
Normal	<90 cm	1.95 (1.34-2.83)*	1.00 (Reference)	0.0005
	≥90 cm	2.63 (1.58-4.40)*	1.00 (Reference)	0.0002
Overweight	<100 cm	1.41 (1.04-1.90)*	1.00 (Reference)	0.0253
	≥100 cm	1.30 (0.92-1.84)	1.00 (Reference)	0.1426
Obese	<110 cm	1.37 (0.90-2.09)	1.00 (Reference)	0.1408
	≥110 cm	2.11 (1.31-3.42)*	1.00 (Reference)	0.0023

Data presented as Hazard Ratio (95% Confidence Interval), * indicates p<.05.

BMI = body mass index, WC = waist circumference.

Normal BMI: 18.5 to <25 kg/m², Overweight BMI: 25 to <30 kg/m², Obese BMI: 30 to <35 kg/m².

¹Model adjusted for age, year of baseline examination, fasting blood glucose, fasting blood cholesterol, systolic blood pressure, diastolic blood pressure, smoking, alcohol intake, physical inactivity, diabetes, hypertension, hypercholesterolemia, and family history of CVD.

Session 2: Cardiometabolic Risk

85-8DgW-204

IS THERE A LONG-TERM EFFECT OF A 3-YEAR MODIFICATION PROGRAM ON THE CARDIOMETABOLIC RISK PROFILE OF MEN WITH ABDOMINAL OBESITY?

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Introduction: We have previously reported the effects of a 3-year lifestyle modification program (3-YLMP) on Cardiometabolic risk variables. The program included a 1-Year active intervention followed by a 2-Year maintenance phase on long-term cardiometabolic risk profile.

Objectives: To examine whether there were residual effects of this 3-YLMP when subjects were re-evaluated 4 years later.

Methods: Of the 94 abdominally obese and dyslipidemic men who initially met the inclusion criteria and accepted to be part of the 3-YLMP, 42 accepted to be re-evaluated 4.04 years after the baseline assessment. Fat distribution was assessed with computed tomography. A standardized submaximal treadmill exercise test was performed to assess cardiorespiratory fitness. After five minutes of rest in sitting position, three heart rate (HR) and blood pressure measurements were taken 3-minutes apart on the nondominant arm. An overnight fast blood sample was obtained followed by an oral glucose tolerance test (OGTT) to evaluate the cardiometabolic risk profile (triglycerides, total cholesterol, HDL-C, LDL-C, glucose and insulin). The areas under the curve from fasting values (AUC) of the OGTT were determined using trapezoid method.

Results: Four years after the completion of the 3-YLMP, weight (-2.2 ± 7.0), body mass index ($-0.7\pm 2.2\text{kg.m}^2$), number of steps per day (1601 ± 3977), % of HR reached at 3.5mph and 2% slope during submaximal exercise ($-3.3\pm 6.6\%$), resting HR ($-5.9\pm 10.1\text{bpm}$), total cholesterol ($-0.3\pm 0.7\text{mmol/L}$), HDL-C ($0.2\pm 0.2\text{mmol/L}$), triglycerides ($-0.6\pm 0.9\text{mmol/L}$), AUC insulin ($-71113\pm 68379\text{nmol/L}\times 120\text{min}$), fasting insulin ($-73.8\pm 84.0\text{pmol/L}$) and glucose ($-0.3\pm 0.4\text{mmol/L}$) were all significantly improved compared to baseline data. No significant difference was found for visceral adipose tissue (VAT), waist circumference, AUC glucose, LDL-C, diastolic and systolic blood pressures between baseline and 4-year post-intervention assessment.

Conclusions: Despite the non-maintenance of VAT decreases 4 years after the completion of the 3-YLMP, several cardiometabolic parameters remained improved compared to baseline. The maintenance of physical activity level and physical fitness after the 3-YLMP could explain these long-term benefits.

Session 2: Cardiovascular Disease

85-e7kZ-293

GENETIC INVALIDATION OF DUSP10 PREVENTS THE DEVELOPMENT OF CARDIOMYOPATHY IN DUSP1/4 DOUBLE-NULL MICE*Hugo Giguère¹, Mannix Auger-Messier²**¹Department of Pharmacology-Physiology, Faculté de Médecine et des Sciences de la Santé, Université de Sherbrooke**²Department of Medicine, Centre de Recherche du Centre Hospitalier Universitaire de Sherbrooke*

Objectives: Mitogen-activated protein kinase (MAPK) p38 is known to negatively regulate cardiac function. By inactivating p38, some specific members of the dual-specificity phosphatase (DUSP) family (i.e. DUSP1, DUSP4 and DUSP10) are susceptible to prevent pathological cardiac development. Accordingly, we previously showed that *Dusp1/4* double-null mice (*Dusp1/4^{-/-}*) developed a dilated cardiomyopathy through a p38-dependant mechanism as they aged. Since DUSP10 is also expressed in the heart, we sought to understand its specific function in cardiac pathogenesis.

Methods: We generated *Dusp10*-null mice (*Dusp10^{-/-}*) by homologous recombination and verified the DUSP10 expression by RT-PCR and western blot in heart extracts. We evaluated both cardiac function and morphology in our different mouse models by echocardiography and histology, respectively. We measured both heart weight and cardiomyocyte dimensions by gravimetric analysis and microscopy, respectively. Phosphorylation levels of the MAPKs in the heart of null mice were analyzed by western blot.

Results: The absence of DUSP10 mRNA and protein in the hearts of *Dusp10^{-/-}* mice confirms the validity of our targeting strategy. Comparatively to *Dusp1/4^{-/-}* mice, neither *Dusp10* single-null nor double-null (i.e. *Dusp1/10^{-/-}* and *Dusp4/10^{-/-}*) mice showed any cardiac functional defects or spontaneously developed any form of cardiomyopathy. Surprisingly, the *Dusp1/4/10* triple-null mice (*Dusp1/4/10^{-/-}*) even prevented the development of the dilated cardiomyopathy observed in *Dusp1/4^{-/-}* mice. In fact, *Dusp1/4/10^{-/-}* mice displayed similar cardiac function, heart weight, and cardiomyocyte dimensions to those from wild type mice. The cardioprotective effect of *Dusp10* gene invalidation coincides with the desensitization of the p38 MAPK pathway observed in the heart of *Dusp1/4/10^{-/-}* mice.

Conclusion: Unlike DUSP1 and DUSP4, our results suggest that DUSP10 promotes p38-dependant dilated cardiomyopathy, and could thus be a valuable target for preventing cardiac pathogenesis.

Session 2: Cardiovascular Disease

85-98ZK-224

CARDIOVASCULAR DISEASES IN PSYCHONEUROIMMUNOLOGICAL ASPECTS- PRELIMINARY REPORT*Dagmara Bartzak¹, Lukasz Szymanski¹, Wanda Stankiewicz¹, Ewelina Zawadzka-Bartzak²**¹Military Institute of Hygiene and Epidemiology**²Military Institute of Aviation Medicine*

Objectives: Cardiovascular diseases due to the prevalence and negative social and economic effects, belong to a group of civilization diseases. Previous researches suggest comorbidity of heart diseases, mood disorders and impaired cognitive functioning. The aim of this study was to evaluate the psychoneuroimmunological aspects of functioning in patients diagnosed with cardiovascular diseases.

Methods: 10 persons, in mean age 48.2 years old, diagnosed with primary hypertension, were studied. All of them were treated with beta blockers and ACE inhibitors with unsuccessful therapeutic effect. This group also included 4 subjects with heart rate disturbances. In the studied group, chronic diseases affecting the autonomic nervous system were excluded. None of the patients had heart failure (NYHA I). The control group included 10 clinically healthy volunteers in mean age 46.8. All participants had 24-hour ECG monitoring with the Holter method in order to evaluate the autonomic activity with time and frequency domain analysis (heart rate variability-HRV). Patients also underwent neuropsychological assessment of quality of life, personality traits and cognitive functioning (CTT, WAIS Digit Span, d2, EQ-5D, WHOQOL, NEO-PI-R, SWLS, MHLC, DS14, Type A, STAI). Quantitative evaluation of immune system parameters included: TCD3, TCD4, CD8, CD16/CD56, CD19, HLA-DR+.

Results: Cardiovascular disease group showed significantly lower time and frequency domain parameters ($p < 0.05$) except LF/HF ratio. Heart rhythm disorders group demonstrated significant relationships such as: 1. Quality of life with Total Power of HRV and day-time LF/HF ratio, pNN50 and rMSSD - negative correlation. 2. Feelings of anxiety with SDNN - positive correlation. 3. Trait anxiety and Digit Span performance (WAIS-R) with day-time LF/HF ratio - negative correlation. 4. Neuroticism (personality trait) with rMSSD and pNN50 - negative correlation. 5. Test of Attention and night values of LF - positive correlation.

Conclusions: 1. In cardiovascular disease patients, activity of the autonomic nervous system is significantly reduced. 2. Impaired modulation of the autonomic nervous system activity, emerges relative or absolute predominance of the sympathetic nervous system in a group of people diagnosed with heart rhythm disturbances affects mood, decreases quality of life and impairs attention. 3. In patients with heart rhythm disturbances, increased sympathetic nervous system activity affects prolonged tension and the immune response.

Session 2: Childhood Obesity

85-Rvdg-295

THE EFFECT OF WAIST CIRCUMFERENCE ON CARDIOMETABOLIC RISK PROFILE IN OBESE ADOLESCENTS ENGAGED IN A MULTIDISCIPLINARY LIFESTYLE INTERVENTION

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Obesity in adolescents is a global public health concern and is associated with a range of health complications. Once established, obesity is difficult to reverse. In this regard, it is essential to implement effective lifestyle interventions to treat this condition. Regular physical exercise within structured lifestyle programs may improve weight status and reduced metabolic risk factors.

Objective: The objective of the present study was to evaluate the effect of a combined physical exercise and lifestyle intervention on anthropometric and metabolic risk factors in obese adolescents.

Methods: Twenty-nine adolescents with a BMI greater than the 95th percentile ($33.6 \pm 5.2 \text{ kg/m}^2$) of both genders and between the ages of 11 and 16 years (14.0 ± 1.6 years) were subjected to a 16-week multidisciplinary intervention program (nutrition, physical exercise and clinical support). Anthropometrics and metabolic variables were obtained at baseline and at the end of the intervention.

Results: Body mass index (33.6 to 32.7 kg/m^2 , $p < 0.0001$) and waist circumference (102.4 to 100.5 cm , $p = 0.001$) were significantly reduced after the 16-week intervention program. We also found a significant decrease in triglyceride levels as well as in total cholesterol/HDL cholesterol ratio whereas HDL cholesterol concentrations were increased ($p < 0.03$). In order to further explore the impact of waist circumference on intervention-induced changes in metabolic risk profile, adolescents were divided into two groups according to their changes in waist circumference. We found that metabolic risk profile was significantly improved only in adolescents who reduced their waist circumference ($p < 0.05$). Cardiorespiratory fitness was also significantly improved in adolescents characterized by waist circumference loss ($p = 0.03$). When subgroups of adolescents with low or high improvements in cardiorespiratory fitness were individually matched ($n = 14$) for similar changes in waist circumference, no significant difference was found in intervention-induced changes in metabolic risk factors between the two groups. Finally, intervention-induced changes in metabolic risk factors were significantly correlated with changes in waist circumference ($p < 0.03$).

Conclusions: These results provide evidence that a multidisciplinary lifestyle intervention may reduce metabolic risk factors among adolescents depending on their degree of waist circumference loss.

Session 2: Diabetes

85-50Vp-273

EFFECT OF BREASTFEEDING ON GLYCEMIC AND INSULIN STATUS OF CHILDREN BORN FROM MOTHERS WITH GESTATIONAL DIABETES MELLITUS: PRELIMINARY DATA

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Objectives: Given that offspring born from mother with gestational diabetes mellitus (GDM) are at high risk of developing type 2 diabetes later in life, the objective of this study was to investigate whether breastfeeding was associated with improved glucose and insulin homeostasis among these children.

Methods: A total of 49 children (3-11 years) exposed to GDM during fetal life participated to the project. Data about duration and exclusivity of breastfeeding were obtained from questionnaires completed by their mothers. Fasting blood samples were collected to evaluate glycemic and insulin status of children. Pearson correlations were performed to assess the association between total breastfeeding duration (including exclusive and non-exclusive breastfeeding) and exclusive breastfeeding duration only with glycemic and insulin status of children. Adjustments for sex, age and BMI z-score were performed.

Results: In this sample, children had an average age of 6.8 ± 2.4 years old. A total of 94% of children were breastfed ($n=46$). Mean duration of total breastfeeding was 9.1 ± 7.0 months and mean duration of exclusive breastfeeding was 4.0 ± 1.9 months. Total breastfeeding duration was negatively associated with glycated hemoglobin (HbA1c) among children exposed to GDM ($r=-0.44$, $p=0.006$). Total breastfeeding duration tended to be negatively associated with fasting insulin concentrations ($r=-0.31$, $p=0.062$). Exclusive breastfeeding duration was also negatively correlated to fasting insulin concentrations ($r=-0.37$, $p=0.035$) but was not associated with HbA1c ($r=-0.19$, $p>0.1$). In addition, there was no association between total or exclusive breastfeeding and fasting glucose ($r=0.19$ and $r=0.24$, $p>0.05$, respectively).

Conclusions: These preliminary findings suggest that breastfeeding duration is associated with improved glycemic and insulin status of children born from mother with GDM. Promoting breastfeeding among women with a pregnancy complicated by GDM could be a strategy to reduce possible metabolic complications among their offspring.

Session 2: Diabetes

85-9psD-293

LONG-TERM OUTCOMES OF BILIOPANCREATIC DIVERSION ON GLYCEMIC CONTROL, INSULIN SENSITIVITY, AND BETA-CELL FUNCTION IN OBESE PATIENTS WITH TYPE 2 DIABETES

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Objective: To assess the long term outcomes of biliopancreatic diversion (BPD) surgery on glycemic control, insulin sensitivity (IS), and beta-cell function of grade I and II obese patients with type 2 diabetes (T2DM) using complementary oral and intravenous dynamic tests.

Methods: 57 women were divided in three groups: 19 lean, 18 obese, both with normal glucose tolerance (NGT), and 20 Obese with T2DM of which underwent BPD and were reassessed 12 months after. OGTTs and hyperglycemic clamps were performed. Mathematical modeling was used to analyze IS, beta-cell function, and delay time of beta-cell response. The disposition indexes basal (DI_{basal} -non stimulated), dynamic (DI_{dynamic} -first phase insulin secretion) and static (DI_{static} -second phase insulin secretion) represents beta-cell function adjusted to IS.

Results: After BPD, BMI (pre: 36 ± 4 , post: 28 ± 3 kg/m²), fasting glycemia (pre: 133 ± 38 , post: 88 ± 13 mg/dl) and HbA1c levels (pre: 7.2 ± 1.3 , post: $5.1\pm 0.9\%$) were reduced ($p<0.001$). At baseline, IS was reduced in the obese groups compared with the LeanNGT group ($p<0.001$); after BPD, increased approximately 6-fold ($p<0.001$) and became comparable to LeanNGT. At baseline, DI_{basal} was reduced in the ObeseT2DM compared with both NGT groups ($p<0.001$); increased 3-fold after surgery and reached similar levels to that of NGT groups ($p>0.05$). Before BPD, the two DI obtained from the OGTT were reduced in the ObeseT2DM compared with NGT groups ($p<0.001$). After surgery, DI_{dynamic} was similar to ObeseNGT and remained reduced compared with the LeanNGT ($p<0.001$), while the DI_{static} restored to the levels of the NGT groups. In the clamp test, after surgery, all of the DI became similar to LeanNGT and were increased compared with the ObeseNGT. Before surgery, the delay time was increased in the ObeseT2DM group compared to the NGT groups ($p<0.05$), reflecting a disruption on the time required to recruit new insulin granules to the pool of readily releasable granules in response to increased glycemia. Post-surgery, delay time markedly decreased ($p<0.05$) and became normalized.

Conclusion: BPD resulted in favorable physiological effects in patients with grade I and II obesity and T2DM, with improvements in a wide range aspects of beta-cell function and IS which probably contributed to the improved glycemic control.

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Session 2: Diabetes

85-6vqk-293

OBESITY PREVENTION THROUGH PROBIOTICS: NEW STUDY OF SOME BACTERIAL STRAINS TESTED IN MICE FED UNDER OBESOGENIC DIET

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Industrialized and developing countries are facing an obesity epidemic, leading to a dramatic increase of several metabolic disorders including insulin resistance and type 2 diabetes. Moreover, it is now well known that the gastrointestinal tract (GIT) microbiota plays an essential role in the development of metabolic diseases, including the development of mucosal barrier unbalance and pro-inflammatory mechanisms. It is in this context, the use of probiotics to manipulate the GIT microbiota drew more attention in order to prevent obesity and to attempt to find new therapeutic targets.

Objectives: Here, we were interested to test in vivo, some lactic acid bacteria (LAB), previously selected in vitro for their anti-inflammatory effects, to determinate if they can have potential probiotic properties.

Methods: 8-weeks-old C57BL/6 mice were divided into 8 groups: 2 control groups and daily gavaged with vehicle (milk), and 6 groups of mice treated with the same obesogenic diet and daily gavaged with one of 6 the bacterial strains (P35 (genus *Propionibacterium*) Lb38, Lb79, Lb102 (*Lactobacillus*), Bf26 and Bf141 (*Bifidobacterium*)) to a dose of 10^9 cfu/day for 8 weeks. Physiological tests were performed during the protocol in order to investigate anti-obesity effect and insulin resistance improvement of bacterial strains.

Results: We found that, without changing food intake, P35, Lb38 and Bf141 significantly reduced total body weight gain compared to HFHS (6,7g ; 7,3g ; 7,3g against 10,1g respectively, $p < 0.05$) mainly explained by a decrease of visceral fat accumulation. These 3 strains and Lb102, also showed a tendency to improve insulin sensitivity, as measured by an insulin tolerance test, and have significantly increased glucose tolerance during an oral test performed at the 8th week.

Conclusions: Further analysis of the microbiota (feces collected during the protocol) and intestinal metabolism (gut sections collected during the sacrifice) will allow us to better understand the mechanisms of action of these promising bacterial strains that could be used to prevent the development of obesity and its consequences.

Session 2: Ectopic Fat

85-Vtu7-253

ASSOCIATION BETWEEN DAILY PHYSICAL ACTIVITY, DIETARY INTAKE AND INTRAHEPATIC FAT*Andrea Brennan¹, Patrick Stroman¹, Robert Ross¹**¹Queen's University*

Objective: Excess accumulation of intrahepatic fat (IHF) is linked to the pathogenesis of insulin resistance and dyslipidemia. Structured moderate-to-vigorous intensity exercise and reduction in energy intake are associated with reductions in IHF. However, whether activities of daily living (ADL) outside of consensus guidelines are associated with IHF is unknown. Given that most North Americans are inactive, the primary purpose of our study was to examine the combined and independent associations between ADL, dietary intake and IHF.

Materials and Methods: Participants included 20 middle-aged, sedentary, abdominally obese adults. IHF was measured using proton-magnetic resonance spectroscopy (H-MRS). Physical activity (PA), both amount and intensity, was measured for the 7 days prior to IHF measurement by accelerometer and subsequently categorized by level of intensity (sedentary, light PA, moderate-to-vigorous PA) using established cut-offs. ADL is represented by total PA that includes all PA > 100 counts per minute. Diet quantity variables (total kilocalories, fat (g), carbohydrate (g), protein (g)) were derived using diet analysis software from manually entered self-reported food logs.

Results: The mean (SD) IHF (%) was 20.2 (16.0)%. All participants were inactive. Both amount and intensity of ADL were not associated with IHF ($p > 0.05$). Total calories ($R^2 = 0.20$) and fat ($R^2 = 0.22$) were significantly associated with IHF, even after controlling for all components of ADL ($p < 0.05$).

Conclusions: Our findings revealed that dietary intake in sedentary, abdominally obese individuals had a greater influence on IHF than ADL. Given that structured exercise is known to reduce IHF accumulation, our observations suggest that PA must meet consensus recommendations for structured moderate-to-vigorous intensity exercise in order to reduce IHF.

Session 2: Ectopic Fat

85-b92x-174

TRUNK MUSCLE ATTENUATION: RELATIONSHIP TO GLUCOSE TOLERANCE IN ABDOMINALLY OBESE DYSLIPIDEMIC MEN

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Objectives: Thigh muscle attenuation measured by computed tomography (CT), a marker of muscle fat infiltration, has been shown to be associated with an altered plasma glucose homeostasis and insulin resistance. Previous studies have reported that high amount of low-attenuation muscle (LAM) in the thigh was related to obesity, insulin resistance and type 2 diabetes. The present study tested the hypothesis that LAM surface of trunk muscles assessed at L4-L5 could substitute the LAM surface of the thigh in the prediction of glucose tolerance and insulin resistance.

Methods: CT scans were performed at the L4-L5 intervertebral disk and mid-thigh levels in 210 abdominally obese dyslipidemic men. Different markers of the cardiometabolic risk (CMR) profile such as waist circumference, fasting lipoprotein-lipid variables and fasting glucose and insulin levels were measured. A 2-hour oral glucose tolerance test was also performed. Muscle attenuation of the core (abdominal and spinal muscles) and psoas muscles was measured using the sliceOmatic software, which allows to separate LAM (0 to 34 HU) from normal attenuation muscle (35 to 100 HU).

Results: Total areas of core and psoas muscles were strongly associated with thigh muscle area ($r=0.59$ and $r=0.70$, respectively, $p<0.0001$). Moreover, LAM areas of core and psoas muscles were strongly associated with LAM area of thigh muscles ($r=0.72$ and $r=0.65$, respectively, $p<0.0001$). Whereas no correlation between LAM area of thigh muscles and fasting glucose, glucose at 2 hours, glucose area and HOMA-IR was found, LAM areas of psoas muscles were associated with all these variables ($0.17<r<0.23$, $p<0.05$). In addition, LAM area of core muscles was significantly associated with glucose area ($r=0.18$, $p<0.05$) and glucose at 2 hours ($r=0.23$, $p<0.001$). Finally, we quantified the independent contribution of LAM areas of core and psoas muscles to the variance in fasting glucose, glucose at 2 hours, glucose area and HOMA-IR taking into account visceral adiposity. Results of multivariate regression analyses showed that variation in plasma glucose-insulin homeostasis variables were explained by visceral adiposity with no independent contribution of LAM areas of psoas and core muscles.

Conclusions: Our results suggest that CT-imaging index of trunk muscle quality is related to glucose tolerance. However, this relationship appears to be mediated by the concomitant variation in visceral adiposity.

Session 2: Epidemiology

85-ivj8-293

RISK OF ADVERSE EVENT FOLLOWING GENERIC VALSARTAN SUBSTITUTION

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Objectives: Once the patent has expired, brand name drugs such as Diovan® (valsartan) can be substituted with generic analogs in pharmacies. Few studies have assessed the clinical impact of this substitution on outcomes. We aimed to evaluate the impact of generic substitution on adverse events (hospitalization, emergency consultations and deaths of any causes) among Diovan® consumers.

Methods: Between February 2009 and 2011, a cohort of Diovan® users among newly diagnosed coronary heart disease or heart failure patients aged > 65 years was constituted with data from the Quebec Integrated Chronic Disease Surveillance System. Exposition to substitution was determined by the date when Diovan® was substituted to any of its generic versions. A fictive date of exposition was randomly assigned to Diovan® users without substitution (unexposed) by matching. The outcome of adverse event 60 days following the exposition date (or fictive date) was compared between groups using a logistic regression model.

Results: This cohort (n=1,478) was constituted of 901 women and 577 men mostly aged between 75-84 years at exposition. Among them, 103/808 exposed (12.8%) and 91/670 unexposed (13.6%) had an adverse event. After adjustment for age, sex and antipsychotics concomitant treatment, the global odds ratio (OR) for the exposed group was 0.92 (p=0.57). OR associated with hospitalization, emergency consultation and death were respectively 0.94 (p=0.83), 0.92 (p=0.61) and 3.89 (p=0.22).

Conclusions: Generic substitutions of Diovan® do not increase the risk of adverse event among elderly newly diagnosed with heart failure or coronary heart disease. Further analysis should be performed to evaluate outcomes one year post-substitution.

Session 2: Hypertension

85-eV6g-104

IMPACT OF A 1-YEAR LIFESTYLE MODIFICATION PROGRAM ON RESTING AND EXERCISE BLOOD PRESSURE IN ABDOMINALLY OBESE MEN WITHOUT HYPERTENSION

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Objectives: To determine whether a 1-year lifestyle modification program aiming at increasing physical activity levels and improving diet quality influences resting and exercise blood pressure in non-hypertensive men with abdominal obesity and dyslipidemia.

Methods: A total of 78 men aged between 30 and 65 years underwent a lifestyle modification program aiming at achieving a minimum of 160 minutes of aerobic physical activity per week at moderate to vigorous intensity and reducing caloric intake (-500 kcal/day) while improving diet quality. All subjects underwent a maximal symptom-limited treadmill exercise test using the Bruce protocol. Blood pressure was measured at 5-min rest prior to exercise testing (anticipatory blood pressure) and at every 3 min during the exercise test. Exercise systolic (exSBP) and diastolic (exDBP) blood pressure were defined as the maximal BP recording minus anticipatory blood pressure reading divided by the length of the exercise protocol.

Results: At baseline, mean SBP and DBP was 116 ± 11 and 79 ± 7 mmHg, respectively. Both resting SBP and DBP were improved following the intervention ($-2,6 \pm 9,8$ mmHg, $p=0,02$ and $-4,8 \pm 6,6$ mmHg, $p<0,001$, respectively for SBP and DBP). Maximal SBP recording during the maximal exercise test significantly decreased following the intervention ($-2,4 \pm 16,0$ mmHg, $p=0,009$), while maximal DBP recording did not change. We also observed that exSBP decreased following the intervention ($-1,15 \pm 2,07$ mmHg/min, $p<0,001$), while exDBP remained unchanged. The latter could be explained by changes in maximal SBP recording during the test, but also by the fact that mean length of the maximal test increased following the intervention ($12,8 \pm 1,9$ minutes at year 1 vs. $10,9 \pm 1,7$ minutes at baseline, $p<0,001$).

Conclusion: Results of this study suggest that increasing physical activity levels, reducing daily caloric intake and improving diet quality can have a beneficial impact on both resting and maximal exercise blood pressure in normotensive abdominally obese men. These results highlight the importance healthy lifestyle habits for the prevention of hypertension in primary prevention.

Session 2: Insulin Resistance

85-fBEH-273

METABOLOMIC PROFILING REVEALS MUSCLE METABOLITES THAT ARE ASSOCIATED WITH FAVORABLE GLUCOSE, LIPID AND ENERGY METABOLISM IN LIPOPROTEIN LIPASE TRANSGENIC RABBITS

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Objectives: Lipoprotein lipase (LPL) transgenic (Tg) rabbits have been shown to be protected against high-fat-diet (HFD)-induced insulin resistance, dyslipidaemia and obesity. Skeletal muscle is a major organ responsible for glucose, lipid and energy metabolism. We analyzed skeletal muscle metabolomic profile, and simultaneously measured insulin resistance index (IRI), serum lipids, and energy expenditure (EE) in LPL Tg and control rabbits under HFD condition.

Methods: At the 15th week of 16-week HFD period, whole body EE was measured using doubly-labeled water ($^2\text{H}_2\text{O}$ and H_2^{18}O) method in the Tg (n=12) and wild-type (control, n=12) rabbits. To assess IRI, an intravenous glucose tolerance test was performed. Fasting serum lipids including triglycerides and free fatty acid (FFA) were also measured. Gastrocnemius muscle (red portion) of HFD-fed rabbits (n=9, each group) were used for metabolomic profiling using capillary electrophoresis mass spectrometry. 165 peaks (98 in cation mode and 67 in anion mode) were detected.

Results: Body weight, IRI, triglycerides and FFA were significantly lower in Tg than controls. EE levels were significantly higher in Tg compared with controls (94.0 ± 6.5 vs. 88.1 ± 7.1 kcal/kg weight/day, $p < 0.05$). Among 165 metabolite concentration levels measured, 41 were significantly different between two groups. In skeletal muscle of Tg, metabolites involved in TCA cycle (e.g., citric acid) were up-regulated, while carnitine (lipid transporter) and electron carriers (NAD^+ , NADH) were down-regulated. Urea cycle metabolites (e.g., ornithine, arginine) were consistently increased. Branched-chain amino acids (Ile, Leu) and other amino acids (Phe, Met, His, Asn, Ser) were increased, while β -Ala was decreased in Tg. Further, correlation analyses (n=18) showed that higher level of muscle citric acid was associated with lower levels of IRI and triglycerides. On the other hand, NADH was positively associated with IRI and triglycerides, while inversely associated with EE. Higher ornithine was associated with lower levels of triglyceride and FFA. Additionally, higher levels of three amino acids (Met, Phe, Asn) were associated with lower triglycerides.

Conclusions: These comparison and correlation analyses identified diverse muscle metabolites that may be involved in favorable regulation of glucose, lipid and energy metabolism in LPL Tg rabbits protected against HFD-induced metabolic disturbances.

Session 2: Insulin Resistance

85-YHc7-303

WAIST CIRCUMFERENCE IS ABLE TO DETECT RISK OF INSULIN RESISTANCE*Fernanda Vidigal¹, Júlia Carraro², Larissa Chaves², Josefina Bressan²**¹Assistant Professor, Faculty of Nutrition, Universidade Federal de Alfenas, Brazil**²Department of Nutrition and Health, Universidade Federal de Viçosa, Brazil*

Objectives: To verify the ability of the waist circumference in predicting insulin resistance in female healthcare professional.

Methods: It was a cross-sectional observational study that integrates a multicenter study LATIN America METabolic Syndrome (LATINMETS). The study sample consisted of 168 female healthcare professional (20-59 years). It was measured weight, height and waist circumference. The biochemical parameters assessed were fasting glucose, insulin and triglycerides. Insulin resistance was assessed by the Homeostasis Model Assessment Index of Insulin Resistance (HOMA-IR) and by the TyG index, a product from the fasting levels of triglycerides and glucose (Guerrero-Romero et al., 2010). It was considered as the cutoff point for insulin resistance the 75th percentile of the evaluated sample. Statistical analysis consisted of ROC curves (Receiver Operating Characteristic Curve). The significance level (α) adopted for all hypothesis tests was 5%. Statistical analysis was performed with SPSS for Windows (version 17.0, SPSS Inc, Chicago, IL) and MedCalc (version 9.3).

Results: Of the 168 female healthcare professional included in the study, 21.2 % of the women were overweight, with a median age of 26 years. In the ROC analysis, the simple anthropometric measurement of waist circumference showed great ability of detecting insulin resistance both through the HOMA-IR [AUC=0.603 (0.045); CI 95%: 0.535 to 0.667] as the TyG index [AUC=0.614 (0.0446); CI 95%: 0.547 to 0.678]. The cutoff points of > 87.2 cm and > 82.0 cm were the ones that reached largest sum between sensitivity and specificity values for waist circumference, showing therefore, to be more accurate in predicting insulin resistance risk through changes in the HOMA-IR and the TyG index, respectively.

Conclusions: The waist circumference represents a useful and accessible anthropometric tool for assessment insulin resistance risk in female healthcare professional.

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Session 2: Insulin Resistance

85-RJso-124

ADIPOCYTE-SPECIFIC KNOCK-OUT OF INDUCIBLE NITRIC OXIDE SYNTHASE AMELIORATES OBESITY-INDUCED INSULIN RESISTANCE

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Objectives: Inflammation is known to play a key role in obesity and its metabolic disorders. Increased expression of inducible nitric oxide synthase (iNOS) was shown to be associated with obesity-linked insulin resistance, and its systemic inhibition has demonstrated beneficial effects on insulin sensitivity in obese models. Nevertheless, the contribution of iNOS from specific insulin-target tissues in metabolic disorders has not yet been determined. The aim of this study was to evaluate the effect of adipocyte-specific iNOS disruption in obesity-induced metabolic disorders.

Methods: To determine the efficiency of the iNOS knock-out adipocyte specific iNOS knockout mice (ADPnos2-KO) and their wild-type littermates (ADPnos2-WT) were either injected with LPS for 6 h, and stromavascular cells were differentiated into adipocytes and challenged with cytokines. For the diet protocol, mice were kept either on a standard chow diet or on a HFHS-diet (65% fat, 15% protein, 20% carbohydrates) for 10 weeks. Insulin (ITT) and glucose tolerance tests (GTT) were performed in mice fasted for 6 h. Triglyceride content was determined in plasma and liver.

Results: ADPnos2-KO mice showed a reduced accumulation of nitrite in adipose tissue after 6 h LPS challenge as well as reduced expression of iNOS in differentiated adipocytes from the SVF fraction of adipose tissue. When challenged with HFHS diet, no difference in food intake or body weight in ADPnos2-KO and ADPnos2-WT mice was observed, although we found a significant reduction in iWAT weight but no difference in the weight of other adipose tissues in ADPnos2-KO mice compared to their littermate controls. Whole body fasting insulinemia and glycemia were not affected by adipocyte-specific invalidation of iNOS. Also, we did not observe any difference in glucose tolerance and insulin sensitivity. Interestingly, we found a significant decrease in plasma and hepatic triglyceride levels in ADPnos2-KO mice as compared to the ADPnos2-WT controls on HFHS diet.

Conclusions: These preliminary data suggest that iNOS conditional disruption in adipocytes may confer protection against obesity-linked detrimental effects on fat accumulation in plasma and liver supporting an important role of adipocyte-derived iNOS in the pathogenesis of obesity-associated metabolic disturbance.

Session 2: Insulin Resistance

85-D4mD-174

**ASSESSING AND TARGETING KEY LIFESTYLE CARDIOVASCULAR RISK FACTORS AT THE WORKPLACE:
EFFECT ON HEMOGLOBIN A1C LEVELS***Natalie Alméras¹, Valérie Lévesque¹, Paul Poirier¹, Jean-Pierre Després¹*¹CRIUCPQ

Objective: Despite the key role played by lifestyle habits in the epidemic proportions reached by obesity as well as type 2 diabetes (T2D), nutritional quality and physical activity levels are not considered as “vital signs” in clinical practice. The present pilot project was conducted to verify whether assessing and targeting lifestyle habits at the workplace could have an impact on hemoglobin A1c levels (HbA1c) of employees.

Methods: Nine hundred employees participated in this pilot intervention project and were recruited through the “Grand Défi Entreprise”, a lifestyle modification program designed for the workplace. The intervention was in the form of a 3-month friendly competition among teams of five employees to favour peer-based support in the adoption of healthier lifestyle habits. Employees were submitted to a comprehensive cardiometabolic and cardiorespiratory health assessment with a mobile risk assessment unit before and after the contest (medical history, nutrition and physical activity questionnaires, resting blood pressure, anthropometric measurements, lipid profile, and cardiorespiratory fitness). To evaluate blood glucose control and also to identify individual at high risk of T2D, the glycated hemoglobin (HbA1c) was measured on frozen sample. Following the baseline evaluation, individual advice on nutrition, physical activity and smoking cessation were provided to support the adoption of healthier lifestyle habits.

Results: At the baseline evaluation, more than 51% of the study sample had increased HbA1c ($\geq 5.7\%$) levels. The HbA1c levels were associated with waist circumference, independently of body mass index. Accordingly, subjects with prediabetes showed a higher waist circumference as well as a more deteriorated cardiometabolic profile compared to workers with normal HbA1c levels. In response to the 3-month lifestyle modification program through a friendly competition, employees with elevated HbA1c and those with diagnosed and treated T2D all significantly reduced their HbA1c levels.

Conclusion: Results of this pilot study suggest that assessing and targeting key lifestyle correlates of cardiometabolic risk profile at the workplace may represent a relevant approach to target abdominal obesity and cardiorespiratory fitness with a clinically significant impact on HbA1c levels.

Session 2: Metabolic Surgery

85-fVs1-263

IS THE ROCHE METHODOLOGY FOR THE DETERMINATION OF VITAMIN D ADEQUATE FOR MONITORING PATIENTS AFTER BARIATRIC SURGERY OF THE BILIOPANCREATIC DIVERSION TYPE?*Ahlem Chouiali¹, Marie-France Langlois¹, Simon Biron¹**¹Faculty of Medicine & Health Sciences, Sherbrooke University*

Introduction: The prevalence of hypovitaminosis D may reach 90 % in patients after bariatric surgery of the BPD type despite supplementation with mega doses of vitamin D. Although LC-MS/MS is the gold standard for vitamin D measurements, it is not routinely used in clinical practice. Our hypothesis is that methods of assays currently used in laboratories of Medical Biochemistry for evaluation of serum 25-hydroxyvitamin D may not recognize equimolarly the two forms of 25-OH D (D2 and D3) thus overestimating the prevalence of vitamin D deficiency and exposing patients to the risk of toxicity.

Objective: To compare two methods of measuring the 25 OHD: the Roche method and the LC-MS/MS method.

Methods: This is a cross-sectional and correlational study with a quantitative measure of three groups: a control group of 50 individuals and two groups of patients post-DBP: 50 supplemented with D3 and 50 supplemented with D2. Patients were recruited during their follow-up visit to the obesity clinics at the CHUS and at the IUCPQ. The calculation of the sample size was performed using the recommendation of the CLSI in 2010 (Clinical and Laboratory Standards Institute). The minimum number required for a correlation of assays in each group is 50 individuals. The study comparing methods (linear regression, Deming and Bland-Altman bias) was performed using the Analyse-it software program considering $p < 0.05$ as statistically significant.

Results: Despite the apparent good correlation between the Roche method and LC-MS / MS in the control group, a considerable bias seems to exist, particularly in the presence of D2. Patients supplemented with D2 showed that the routine method underestimated the total vitamin D by 65 %.

Conclusion: The results of this study will allow us to offer the best method to detect and monitor treatment of vitamin D deficiency in obese population in pre- and post-BPD.

Session 2: Metabolic Syndrome

85-FXdR-293

ASSOCIATION OF APOC3 POLYMORPHISM WITH RISK PHENOTYPES OF NON-ALCOHOLIC FATTY LIVER DISEASE

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Nonalcoholic fatty liver disease (NAFLD) is an emerging liver disorder with worldwide prevalence range of 20-30% while 5-30% in South Asia including Pakistan. Besides obesity and type 2 diabetes mellitus, NAFLD is currently an important public health issue. Besides other environmental factors, a strong genetic predisposition towards disease development exists in several populations. In our current efforts to understand the etiology of NAFLD, we have focused on the investigation of risk factors (anthropometric and biochemical) responsible for the development of NAFLD and their association with APOC3 gene SNPs in Pakistani population. A total of 270 subjects (NAFLD cases=170, controls=100) were recruited for this case control study. In order to explore the effect of risk phenotypes (age, gender, dyslipidemia, hypertension, and aminotransferases) towards NAFLD development, association analysis was performed using age and sex -adjusted logistic regression model (OR at 95% CI, $p < 0.05$). We focused on the analysis of two SNPs, rs2854116 and rs2854117 of APOC3 gene by employing genotyping techniques like PCR-RFLP and ARMS-PCR. Significant association of both SNPs with NAFLD was found (rs2854116 $p = 0.03$ and rs2854117, $p < 0.0001$) in our study population. Under case-control status, only rs2854117 SNP showed significant association with hyperlipidemia (OR=6.15, $p = 0.019$) while rs2854116 SNP lacked significance of association with all risk phenotypes. However in NAFLD case only status, significant association of rs2854116 was found with levels of AST ($p = 0.024$) whereas rs2854117 was found associated with ALP levels ($p = 0.007$). Association analysis of APOC3 gene SNPs Haplotypes with risk phenotypes revealed strong association of AA haplotype with Triglyceride Levels ($P = 0.005$). Our results could provide better understanding of the molecular mechanisms leading to the development of NAFLD, management and identification of possible therapeutic targets.

Session 2: Metabolic Syndrome

85-ebKW-124

NON-ALCOHOLIC STEATOHEPATITIS INDUCED BY HIGH FAT AND CHOLESTEROL DIETARY INTAKE IS WORSEN IN A RODENT MODEL HARBORING FEATURES OF METABOLIC SYNDROME

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Objective: While non-alcoholic fatty liver disease (NAFLD) is considered a benign condition associated with “simple steatosis”, non-alcoholic steatohepatitis (NASH) is characterized by varying degrees of hepatic inflammation and fibrosis contributing to liver failure. Although the causes involved in the progression of NAFLD toward NASH remain to be clarified, evidence suggests that metabolic syndrome (MetS) and high dietary intake of fat and cholesterol are important risk factors. The objectives of the present study were to clarify the impact of dietary fat and cholesterol on liver damages and to evaluate if these alterations are worsen in a model harboring features of Mets.

Methods: Male C57BL/6J (Ctrl) and LDL receptor knock out mice expressing apolipoprotein B100 only (LDL^{-/-}), a model recapitulating features of human MetS, were assigned to one of the following diets: 1-Standard chow (S), 2- high cholesterol (HC), high fat (HF) or 4-HCHF diet. Following 25 weeks of dietary intervention, mice were sacrificed and their liver weighed and snap frozen for later analysis or fixed in formalin for histological analysis.

Results: Both dietary components, high fat and cholesterol, were required to develop a NASH-like phenotype in both Ctrl and LDL^{-/-} mice. This was revealed by histological analysis showing concomitant and significantly greater levels of liver steatosis, fibrosis % and inflammatory cell foci in HCHF. These findings were also associated with liver collagen-1 gene overexpression and plasma IL-1 β level. Of note, all these alterations were or had a trend to be more pronounced in LDL^{-/-} than Ctrl mice (liver fibrosis %: p=0.06, collagen-1 gene expression: p=0.05, inflammatory cell foci: p=0.07, IL-1 β level: p=0.002). Interestingly, while the expression level of genes involved in bile acid metabolism were not modulated by the diet in Ctrl mice, several were downregulated (Slco1a1: p=0.04, Slc10a1 p=0.05, Cyp7a1: p=0.02) or upregulated (Lpcat1a p=0.03) in HCHF fed LDL^{-/-} mice.

Conclusions: Our results indicate that liver fibrosis and inflammation induced by high fat and cholesterol feeding are exacerbated in a model with features of Mets. While further studies will have to be performed, it seems that alterations of bile acid metabolism may have contributed to accelerate NASH progression in LDL^{-/-} mice.

Session 2: Metabolic Syndrome

85-t87M-144

SUGAR SWEETENED BEVERAGES AND METABOLIC SYNDROME IN MEXICAN ADULTS

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Objective: The aim of this study is to examine the association between sugar sweetened beverages (SSB) and Metabolic Syndrome (MS) in adults with some cardiovascular risk factor, whom participated in chronic disease screening in Mexico.

Methods: It was invited to participate to this study to 1834 adults ≥ 30 years with some cardiovascular risk factor from communities with economic marginalization of one state of Mexico. Dietary information was obtained with a Food Frequency Questionnaire. Trained personnel obtained anthropometric measures. A fasting blood sample was collected to determine lipids profile and glucose levels. To evaluate the association between SSB intake and MS, we used a logistic regression model adjusting for sex, age, physical activity, energy intake other than SSB and previous diagnosis of diabetes. The SSB intake was categorized in quartiles and the MS diagnosis was made using the AHA/IDF/NHLBI/WHF/IAS/IAOS criteria.

Results: 68.2% of the population had MS (70.5% women and 61.5% men). The mean intake of SSB was 604.1 ml/ day (576 ml women and 681 ml men). 75% of population had a consumption of SSB higher than 339 ml/day. The highest quartile of SSB consumption (>805 ml/day) had 66% more possibility to have MS compared to the lowest quartile of SSB consumption (< 212 ml/day) ($p<0.05$).

Conclusions: High consumption of SSB in Mexican adults from communities with economic marginalization is associated with the presence of MS. The implementation of public policies, that promote safe drinking water in these communities, could help to reduce SSB consumption in this population.

Session 2: Nutrition

85-UTRw-243

SYSTEMATIC REVIEW ON THE EFFECTS OF YOGURT ON CHRONIC DISEASES RISK MARKERS IN ADULTS*Kazutoshi Nishijima²,**Audrée-Anne Dumas¹, Annie Lapointe¹, Marilyn Dugrenier¹,
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Objectives: We reviewed the results of randomized controlled intervention studies that have assessed the effects of yogurts containing both and only *Lactobacillus Bulgaricus* and *Streptococcus Thermophilus* (LBST) on chronic diseases risk markers in adults.

Methods: We performed a systematic search in December 2013 in the following electronic databases: PubMed, EMBASE and The Cochrane Library. Included studies were randomized controlled trials reporting risk markers of chronic diseases (e.g. blood lipids, blood pressure and inflammatory markers) using as comparator(s) a usual diet or a diet supplemented in another yogurt/milk product or food/ingredient on healthy or chronically ill adults. Studies that assessed these following risk markers were excluded: *Helicobacter pylori*, hematological and immunological markers.

Results: Thirty three randomized controlled trials involving 1135 participants were included in the review. Studies were conducted in various countries in America, Europe and Asia. Eighteen studies included adults with at least one chronic disease risk factor. Studies varied considerably in terms of comparators, dose, length of study, and risk markers assessed. The risk of bias in the included studies was generally high or unclear as information for assessment was not available. LBST yogurt showed beneficial effects on some risk factors (e.g. total cholesterol) when within treatment effects were considered. However, when compared to another treatment, the effect would be in favor of the other treatment (e.g. probiotic yogurt), or there was generally either no difference in effect between the two treatments. No difference or not described effect was reported in the two studies that compared a LBST supplemented diet to a usual diet not supplemented with any other treatment.

Conclusions: The methodological limitations found in the studies included in this systematic review make conclusions unclear about the effect of LBST yogurts on chronic disease risk factors in adults when compared to an alternative dietary treatment consisting of a diet supplemented with another food product or a usual diet. Further large-scale well-designed studies comparing a usual diet to an experimental diet including LBST yogurt are warranted to effectively assess whether regular LBST should be included in people's usual diet to prevent or contribute to the management of chronic diseases.

Session 2: Nutrition

85-ppSH-24

DEVELOPMENT AND VALIDATION OF QUESTIONNAIRES FOR THE ASSESSMENT OF SODIUM INTAKE AMONG THE FRENCH-CANADIAN

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The high sodium consumption is an emerging concern worldwide. Besides the number of debates that have emerged regarding the optimal levels of sodium intake, it is largely recognized that excessive intake of sodium is related to the development and progression of cardiovascular diseases. Thus, a clear picture of this dietary behavior is important in order to better guide health professionals in their counseling regarding a healthier salt intake. In this sense, self-reported measures are very interesting instrument to be used along with the objective measure of urinary sodium excretion, which is considered the gold-standard for the assessment of salt intake. Self-reported measures allow an assessment of consumption over time and, importantly, they allow the identification of the main sources contributing to the overall salt intake that is essential to guide educational interventions. Up to now, there are no specific questionnaires aimed at assessing the sodium intake for the French-Canadian population. Thus, the purpose of this communication is to present the process of development and validation of two self-reported measures of sodium intake for the French-Canadian population: a Sodium - Food Frequency Questionnaire and a questionnaire assessing the use of discretionary salt. The results of the steps of development, pre-test and reliability according to the criterion of temporal stability will be presented, as well as the preliminary results of the validation tested by the correlation with the 24-h urinary sodium excretion. The validation of these self-reported measures will allow a better evaluation of the sodium intake among the French-Canadian citizens and thus, will better guide our interventions targeting a healthier salt intake.

Session 2: Nutrition

85-93vL-124

METABOLOMICS REVEALS MODIFICATIONS IN ACYLCARNITINES PROFILE OF LDLR^{-/-}/APOB100/100 MICE TREATED WITH ω -3 PUFAS AND SALMON-DERIVED BIOACTIVE PEPTIDES

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Objective: We previously reported that a low-molecular salmon peptide fraction (SPF) and ω -3 PUFAs can alleviate features of metabolic syndrome (MetS) in obese mice. We aimed to understand the mechanisms of action of both dietary components by doing a complete metabolomic profiling in the plasma of these mice.

Methods: Four groups of LDLR^{-/-}/ApoB^{100/100} mice were fed for 12 or 24 weeks a high-fat sucrose (HFS) diet varying in their protein source (casein hydrolysate (CH) or SPF), in the presence or absence of fish oil (FO). Diet groups are : 1) CH (HFS control group), 2) CH+FO (HFS+FO), 3) SPF (HFS+SPF) or 4) SPF+FO (HFS+SPF+FO). A fifth, reference group, was fed with a standard chow diet (SC). Glucose tolerance, lipid homeostasis, adipose tissue inflammation and hepatic insulin signaling were assessed during the protocol. A total of 63 metabolites were measured by tandem MS/MS in the plasma of these mice.

Results: After 12 weeks of dietary treatment, the HFS+FO and HFS+SPF+FO groups had significantly lower plasma levels of long-chain acylcarnitines C14:2, C16:1, C16, C18:2, C18:1, C18 and C20:4 (for all : protein effect, $P \leq 0.01$, lipid effect, $P \leq 0.006$) without changes in other metabolites. After 24 weeks on diet, the same groups had lower levels of acylcarnitines C18:1, C18:2 and C20:4 (for all, protein effect, $P \leq 0.03$; lipid effect, $P < 0.001$). Both 12 weeks and 24 weeks treatment periods resulted in improved glucose tolerance in these obese dyslipidemic mice.

Conclusion: These results show that after 12 and 24 weeks of dietary treatments, FO-fed mice had an improved glucose tolerance, which was associated with lower plasma accumulation of acylcarnitines. The later suggests a potential improvement in mitochondrial function which is currently being tested.

Session 2: Nutrition

85-RV8q-174

NUTRITIONAL QUALITY, A KEY INDICATOR OF HEALTHY LIFESTYLE, CARDIOMETABOLIC RISK AND CARDIORESPIRATORY FITNESS

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Objective: To evaluate the cardiometabolic risk profile and the cardiorespiratory fitness (CRF) of men and women based on the nutritional quality (NQ) of their diet.

Methods: A cohort of 3252 employees (2365 men and 887 women) was recruited through the “Grand Défi Entreprise”, a lifestyle modification program designed for the workplace. Participants were asked to complete standardized questionnaires on medical history and lifestyle (including NQ and physical activity level (PAL)). Anthropometric and cardiometabolic risk profile variables were collected whereas CRF was assessed. Participants were stratified according to their nutritional quality index (NQI) (low, moderate or high-risk) using a validated questionnaire (Bailey et al). The CRF was estimated using a submaximal treadmill test according to a protocol developed in our laboratory. A standardized VO₂max classification was used to calculate the percentile rank for each participant based on their age and sex.

Results: Men with low-risk NQI presented a higher PAL than those with moderate or high-risk NQI (7.3±6.1, 5.1±7.1 and 3.9±4.2 hours/week, p<0.001, respectively). Similar results were observed in menopausal and non-menopausal women (p<0.05). Men with low-risk NQI also showed healthier cardiometabolic risk profile with lower concentration of triglycerides (1.9±1.1 vs. 2.2±1.2mmol/L, p<0.001) and lower total cholesterol/HDL-cholesterol ratio (3.8±1.0 vs. 4.0±1.2, p<0.05) than men with high-risk NQI. They also had a lower waist circumference (WC) than men with moderate or high-risk NQI (92.6±9.3, 96.3±11.4 and 98.5±12.8 cm, p<0.001, respectively). Non-menopausal women with low-risk NQI had lower total cholesterol/HDL-cholesterol ratio than those with moderate or high-risk NQI (2.9±0.7, 3.1±0.8 and 3.1±0.7, p<0.05, respectively). Significant differences were observed with WC (p<0.05). Men and non-menopausal women with low-risk NQI presented a better CRF than those with high-risk NQI as shown by their VO₂max percentile (p<0.001).

Conclusion: NQ is a good indicator of overall healthy lifestyle habits, which translate into a healthy cardiometabolic risk profile and a high level of CRF suggesting a reduced risk of chronic societal cardiometabolic diseases.

Session 2: Obesity

85-6Tv4-243

AUTONOMIC DYSFUNCTION IN EXTREME OBESITY*Ewelina Zawadzka-Bartczak¹**¹Military Institute of Aviation Medicine*

Heart rate variability (HRV) provides valuable information in various clinical settings. Limited information exists on changes in cardiac autonomic modulation in extremely obese patients (BMI>40). The aim of this study was to investigate the influence of extreme (morbid) obesity and concomitant diseases on cardiovascular autonomic function.

Participants of this study are 22 women and 18 men (total of 40) in mean age 47,9 years old diagnosed with morbid obesity (mean BMI =47,49) and hospitalized to further bariatric treatment. In 22 patients diagnosed with hypertension (treated with beta blockers and ACE inhibitors along with well controlled blood pressure), type 2 diabetes (treatment with the oral drugs) also occurred. Furthermore, 26 patients were diagnosed with depression (>10 points on Beck Depression Inventory). None of the participants used antidepressants or sedative agents. In studied group, chronic diseases affecting autonomic nervous system were not diagnosed. Total of 40 healthy (22 women and 18 men) in mean age 42,7 years old and with mean BMI= 24,6 were formed in group of controls. All of patients had 24-hour ECG monitoring with Holter method in order to evaluate the autonomic activity with time and frequency domain analysis (heart rate variability - HRV).

Results: Obese group showed a significant reduction of parasympathetic activity and a significant increase in sympathetic activity. No significant differences in cardiac autonomic modulation were noted between the Hypertensive-Diabetic patients and those, only with morbid obesity. However, in studied group, obese patients with depression had lower time and frequency domain parameters ($p<0.05$) except SDNN, SDANN and LF/HF ratio in contrast to obese non-depressive individuals. Additional load of diabetes and hypertension in depressed patients did not affect the cardiac autonomic modulation differences. Further prospective study can be undertaken within the same subjects to evaluate the effect of weight loss on the cardiac autonomic activity.

Conclusions: 1. Extreme obesity altered cardiac autonomic activity independently of hypertension and diabetes. 2. Depression associated with morbid obesity intensified HRV reduction.

Session 2: Obesity

85-fvUt-263

IS THERE A CORRELATION BETWEEN NECK CIRCUMFERENCE AND CARDIOMETABOLIC RISK FACTORS?

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Objective: The aim of this study was to investigate the relationship of Neck Perimeter and Cardiometabolic Risk Factors (CRF) in obese adults, in order to determine this anthropometric parameter as a determinant factor for cardiometabolic diseases.

Methods: A total of 74 obese adults were recruited with a mean age of 41,00 (± 6,17) years old and mean body mass index of 34,49 (± 3,06) kg/cm². This is a transversal study. The body composition was assessed by anthropometric measures and dual-energy X-ray absorptiometry (DEXA). The blood pressure was measured using a mercury gravity manometer with appropriate cuff size. The biochemical plasma levels were determined after collecting blood of volunteers, and they were analyzed using reagent kits for substrates of Labtest®. The statistical analysis were calculated with the Pearson or Spearman correlation test, to verify if there was a correlation between the variables, according to the normality of the samples.

Results: According with the results, we observed after the correlation analysis of Neck Perimeter and CRF, there was positive correlation between this anthropometric measure and Body Mass (kg), Body Mass Index (BMI) (kg/m²), Systolic Blood Pressure (SBP) (mmHg), Diastolic Blood Pressure (DBP) (mmHg), Triglycerides (ml/dl), VLDL (ml/dl), Percentage of Fat (% Fat) and Waist Perimeter (Table 1).

Table 1: Correlations Analysis

	Correlated with CRF	R value	P value
Neck Perimeter (cm)	Body Mass (kg)	0,649	0,001
	BMI (kg/m ²)	0,324	0,005
	SBP (mmHg)	0,245	0,035
	DBP (mmHg)	0,302	0,009
	Triglycerides (ml/dl)	0,328	0,005
	VLDL (ml/dl)	0,328	0,005
	% Fat	0,541	0,001
	Waist Perimeter (cm)	0,567	0,001

BMI- Body Mass Index; SBP- Systolic Blood Pressure; DBP- Diastolic Blood Pressure; % Fat- Percentage of Fat.

Conclusion: The highlights findings showed a correlation between Neck Circumference and CRF. Indeed, there is a potential tool for the clinical practice and cardiometabolic health using the neck circumference in this population.

- 1. Conflict of Interest:** None Disclosed.
- 2. Funding:** Research support FAPESP, CAPES and CNPq.

Session 2: Obesity

85-Jbq8-273

BONE METABOLISM AND BODY COMPOSITION IN ADULTS WITH HYPERTRIGLYCERIDEMIC WAIST PHENOTYPE: EFFECTS OF INTERDISCIPLINARY THERAPY

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Objectives: To assess the effects of long-term interdisciplinary therapy (IT) on bone metabolism and body composition in obese adults with and without hypertriglyceridemic waist phenotype (HTW).

Methods: Thirty-eight (38) adult obese women were submitted to a 32 week IT. The IT consisted of intervention with physical exercise, physiotherapy, nutritional and psychological support. Anthropometric measurements, body composition, bone mineral density (BMD), bone mineral content (BMC) and triglyceride (TG) blood concentration were evaluated before and after the therapy. The subjects were stratified in two groups: Group 1 (HTW Phenotype): elevated waist circumference (WC) and TG; Group 2 (Absence of HTW Phenotype): Elevated WC and normal TG or normal WC and elevated TG or normal WC and TG. The paired Student t-test and Wilcoxon test were used to assess the data.

Results: The IT promoted improvement in body mass, body Mass Index, neck circumference, WC, hip Circumference, fat mass (kg), triglyceride and total BMC for both groups, fat mass (%) for Non-HTW group and Upper Limb BMD for HTW group. The baseline values are different for neck circumference, fat mass and triglyceride comparing the two groups. The magnitude of change (ΔValue) was different in the two groups for Body mass, Body Mass Index, WC, Fat mass (%) and Triglyceride (Table 1).

Variables	HTW (n=15)			Non-HTW (n=23)		
	Baseline	After Therapy	ΔValue	Baseline	After Therapy	ΔValue
Body mass (kg)	93.7±15.8	89.9±15.7‡	-3.74 ±4.13	93.4±8.35	86.7±8.45‡	-6.78±3.99‡
BMI (kg/m ²)	33.5±3.64	32.2±3.77‡	-1.35±1.39	34.7±2.52	32.1±2.45‡	-2.60±1.59‡
Neck Circumference (cm)	37.8±2.15	36.7±2.56‡	-1.02±1.25	36.1±2.17*	35.3±2.27‡	-0.82±1.47
Waist Circumference (cm)	105.7±7.90	102.2±6.95‡	-3.49±3.65	106.1±8.98	98.7±8.04‡	-7.34±4.97‡
Hip Circumference (cm)	119.6±10.1	117.1±9.24‡	-2.55±4.21	121.9±6.06	117.3±5.76‡	-4.55±3.50
Fat mass (kg)	43.1±8.96	40.1±8.26‡	-2.89±3.52	44.3±5.18	39.4±5.72‡	-4.91±2.75
Fat mass (%)	47.7±4.11	46.7±3.35	-1.01±2.95	50.1±3.33*	47.2±3.78‡	-2.88±2.11‡
Free Fat Mass (kg)	49.4±7.51	48.2±7.68	-1.20±2.21	46.9±4.93	46.7±4.37	-0.16±1.42
Triglyceride (mg/dl)	178.1±27.5	141.4±28.9‡	-36.5±41.1	126.9±13.2*	136.4±22.1‡	9.48±20.1‡
TOTAL BMC (g)	2730.2±361.6	2806±426.3‡	75.8±114.8	2826.5±307.7	2900.3±347.4‡	73.8±106.4
Upper Limb BMC (g)	380.4±67.2	376.9±69.7	-3.53±55.8	383.3±59.7	287.4±58.8	4.13±30.1
Lower Limb BMC (g)	1040.2±154.6	1026.4±158.1	-13.8±50.6	1053.3±120.6	1057.9±109.5	4.60±46.9
TOTAL BMD (g/cm ²)	1.21±0.88	1.21±0.81	0.002±0.03	1.25±0.85	1.25±0.82	0.001±0.18
Upper Limb BMD (g/cm ²)	0.96±0.09	0.99±0.07‡	0.02±0.04	1.01±0.69	1.02±0.67	0.004±0.38
Lower Limb BMD (g/cm ²)	1.30±0.14	1.27±0.10	-0.03±0.19	1.29±0.93	1.33±0.12	0.03±0.13

*: Statistical differences in baseline values between WTH and non-WTH groups with p<0.05;

‡: Statistical differences in baseline vs after therapy in the same group with p<0.05;

‡: Statistical differences in Δ Values between WTH and non-WTH groups with p<0.05.

Conclusions: IT for adults obese with or without HTW Phenotype could regulate bone mineral metabolism as result of an increased BMC. For both groups the IT promoted improvement of anthropometric and body composition parameters, but the changes are better in the group without HTW phenotype.

1. Conflict of Interest: None Disclosed.

2. Funding: Research relating to this abstract was funded by FAPESP and CNPq.

Session 2: Obesity

85-RmpZ-293

INFLUENCE OF AT1 RECEPTOR BLOCKADE ON THE MYOCARDIAL TYPE I AND III COLLAGEN IN OBESE RATS BY SATURATED HIGH-FAT DIET

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Objective: The objective of this study was to test the hypothesis that increase myocardial type I and III collagen in obese rats by saturated high-fat diet is related with activation of AT₁ receptor of the renin-angiotensin system.

Methods: Thirty-day-old male Wistar rats were randomized into two groups: control (C), fed a standard diet and obese (Ob), fed a high-fat diet rich saturated fatty acids by 30 weeks. After 30 weeks of dietary intervention, each group were randomized into two subgroups: C and C+Losartan(Los); Ob and Ob+Los; the subgroups C and Ob continued to receive their respective diets for over a five week and the C+Los and Ob+Los groups addition of nutritional support, were treated with losartan, an antagonist drug of AT₁ receptors. After this period of 35 weeks, it was analyzed nutritional and metabolic profiles. The cardiac remodeling process was analyzed by systolic blood pressure(SBP) and structural and molecular studies; the hypertrophy was assessed post-death by macroscopic analysis and the molecular analysis of type I and type III collagen proteins expression was performed by Western Blot. Statistical analysis: ANOVA and Tukey Post Hoc Test (p<0,05).

Results: The final body weight, total body fat and adiposity index were elevated in both obese groups. In contrast, obesity was associated with disorders of glucose metabolism, insulin and leptin, which were minimized by blocking of AT₁ receptor. Taking into account cardiovascular profile, SBP was elevated in Ob group compared to C and reduced in both groups treated with losartan. The weight átrio(AT), AT/tíbia, weight right(RV) and left(LV) ventricle and RV/tibia variables were increased in Ob+Los compared to C+Los. In both biometric conditions, the administration of losartan caused reductions in LV and LV/tibia variables. In relation to myocardial type I and III collagen, focus of this study, Ob group exhibited higher expression of these proteins compared to C, and both groups treated with losartan showed lower levels of collagen type I and III in relation to non-medicated counterparts.

Conclusion: The hypothesis of this study was confirmed as the increase myocardial type I and III collagen in obese rats by saturated high-fat diet is related with activation of AT₁ receptor of the renin-angiotensin system.

Session 2: Obesity

85-AfDC-174

BREASTFEEDING INITIATION: IMPACT OF OBESITY IN A LARGE CANADIAN PERINATAL COHORT STUDY

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Objective: To evaluate incidence of breastfeeding initiation according to maternal pre-pregnancy body mass index (BMI) in “Grossesse en Santé”, a large prospective birth cohort in Quebec City.

Methods: Breastfeeding initiation in the post-partum period, pre-pregnancy BMI, sociodemographic determinants and obstetrical and neonatal factors were collected from years 2005 to 2010 in 6592 women with single pregnancies. Prenatal non-intention to breastfeed was documented in a subgroup of the cohort (years 2009-2010). Log-binomial regression analyses were performed to assess relative risk (RR) of non-initiation of breastfeeding between maternal BMI categories in models including pre- and post-natal determinants, after exclusion of variables with a mediating effect.

Results: Twenty percent (20%) of obese women did not initiate breastfeeding in the post-natal period at hospital compared to 12% for normal weight women. Compared with those having a normal pre-pregnancy BMI, obese women had a higher risk of non-initiation of breastfeeding ($RR_{unadj} 1.69$, 95% CI 1.44-1.98), even after adjustment for prenatal and sociodemographic factors ($RR_{adj} 1.26$, 95% CI 1.08-1.46). Furthermore, the risk of non-initiation of breastfeeding in obese women still remained higher after introduction of pre- and post-natal factors ($RR 1.22$, 95% CI 1.04-1.42). The prenatal non-intention to breastfeed was strongly associated with the non-initiation of breastfeeding for all categories of BMI.

Conclusion: Maternal obesity is associated with a two-fold rate of non-initiation of breastfeeding. Considering the benefits of breastfeeding and the increasing obesity rate, adapted interventions and specialized support should target both pre- and immediate post-natal periods in this population.

Session 2: Pathophysiology/Basic Science/Animal Studies

85-xaKf-124

PROTEIN TYROSINE PHOSPHATASE SHP1 MODULATES PPAR IN HEPATIC AND ADIPOSE CELLS: POTENTIAL ROLE IN THE DEVELOPMENT OF OBESITY-LINKED DIABETES

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We recently found that the expression of the protein tyrosine phosphatase Shp1 is increased in insulin target tissues (liver, muscle and adipose tissue) of mice fed a high-fat diet (HFD). Moreover, mice carrying a hepatocyte specific knockout of Shp1 are protected from fasting hyperglycemia and insulin resistance induced by obesity. Unexpectedly, these mice accumulate more fat in the liver compared to obese control mice, but are protected against inflammation and hepatocellular damage going along with increased expression and activity of PPAR γ transcription factor, a key regulator of adipogenesis.

Objectives: Determine whether the interaction between Shp1 and PPAR γ plays a role in the development of diabetes and obesity.

Methods: PPAR γ activity was measured by luciferase assay using a reporter gene containing the PPAR responsive element in HEK293 cells overexpressing Shp1. 3T3-L1 adipocytes were analyzed for Shp1 and PPAR γ expression. Co-immunoprecipitation analysis of PPAR γ and Shp1 was performed and PPAR γ phosphorylation on tyrosine residues was studied in different cell models transfected with PPAR γ . Potential Shp1 tyrosine targets in the PPAR γ sequence were identified by mass spectrometry in HepG2 and HEK293T cells.

Results: Overexpression of Shp1 negatively modulated the transcriptional activity of PPAR γ , even in the presence of an agonist, rosiglitazone. Knowing that PPAR γ plays an important role in adipose tissue, we analyzed the expression of Shp1 and PPAR γ during differentiation of 3T3-L1 cells and found that Shp1 expression decreased in the early differentiation phase. After immunoprecipitation of PPAR γ from 3T3-L1 cells, we found that endogenous PPAR γ was tyrosine phosphorylated. Co-immunoprecipitation experiments further showed that Shp1 interacts with PPAR γ in HEK293T cells. Moreover, tyrosine phosphorylation of PPAR γ was also observed in primary hepatocytes, HepG2 and HEK293T cells. In the last two models, several tyrosine residues were found to be phosphorylated in the PPAR γ sequence. Mutagenesis was performed on those sites and their specific roles are currently being analysed.

Conclusions: We demonstrate for the first time that Shp1 directly controls the activity of PPAR γ possibly by tyrosine dephosphorylation in adipocytes and hepatocytes. Recognizing that several mechanisms regulate the activity of PPAR γ , tyrosine phosphorylation could be a new therapeutic target in metabolic disorders.

Session 2: Physical Activity/Exercise

85-3mCX-293

THE RELATIONSHIP BETWEEN OUTDOOR TIME AND PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR, AND PHYSICAL FITNESS IN CHILDREN: A SYSTEMATIC REVIEW*Guylaine Chabot¹, Casey Gray², Richard Larouche², Mark Tremblay³*¹CRIUCPQ²Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research³Department of Pediatrics, Children's Hospital of Eastern Ontario Research Institute

Objectives: The objective of this systematic review was to examine the relationship between outdoor time and (1) physical activity, (2) cardiorespiratory fitness, (3) musculoskeletal fitness, (4) sedentary behaviour; or (5) motor skill development in children aged 3-12 years.

Methods: A systematic search of electronic databases yielded 7002 records. The five eligible indicators in this review were: physical activity (any intensity and all forms); cardiorespiratory fitness (submaximal exercise capacity, maximal aerobic power, heart functions, lung functions, blood pressure); musculoskeletal fitness (power, strength, endurance, bone density); sedentary behaviour (prolonged sitting, screen time such as watching television, playing video games, computer use, or motorized transportation), and motor skill (agility, balance, coordination, speed of movement). Risk of bias for individual papers was examined in line with the Cochrane Handbook. The GRADE framework was used to assess the quality of evidence from this review. Heterogeneity of data prevented meta-analysis and data were described using narrative synthesis.

Results: Twenty-eight eligible studies (30 papers) were identified from 9 countries, with a cumulative sample of ~13,798 participants. The systematic review revealed overall positive effects of outdoor time on physical activity, sedentary behaviour, and cardiorespiratory fitness. Motor skill development was unrelated to outdoor time; however, this relationship was only examined in a single study of preschool children. No studies were found that examined associations between outdoor time and musculoskeletal fitness.

Conclusions: The systematic review provides consistent evidence that children aged 3-12 years who spend more time outside are more active and less sedentary. All of the included studies reported positive effects on movement behaviours and fitness outcomes. Positive findings were apparent across all ages, sexes and contexts (e.g., preschool, physical education, leisure time). The quality of evidence across each outcome ranged from 'very low' to 'moderate'. There is a need for more evidence from studies using randomized research designs to examine whether increasing outdoor time leads to increased physical activity and decreased sedentary time.

Session 2: Physical Activity/Exercise

85-1Dvh-104

USEFULNESS OF A SUBMAXIMAL EXERCISE CAPACITY TEST TO IDENTIFY THE UNFIT PHENOTYPE AND CARDIOMETABOLIC RISK PROFILE IN ABDOMINALLY OBESE MEN

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Objectives: To determine whether a submaximal exercise capacity test could be useful to identify unfit individuals and to determine whether it could be used to monitor changes in the cardiometabolic risk profile in abdominally obese men following a 1-year lifestyle modification program.

Methods: A total of 116 men aged 30 to 65 years with abdominal obesity and dyslipidemia underwent a 2-hour oral glucose tolerance test (OGTT). These men also performed a maximal (max) symptom-limited treadmill exercise test using the Bruce protocol. Heart rate at a standardized submaximal workload (3,5 miles per hour with a 2% slope) was used as a measure of cardiorespiratory fitness. We determined the agreement between the identification of the unfit phenotype based on the max exercise capacity test (bottom quartile of the length of the exercise protocol [$<9,7$ minutes]) and submax exercise workload (bottom quartile of the heart rate at the submax workload [<126 beats per minutes]) using spearman correlations and the Cohen Kappa test. Of this group, 78 underwent a lifestyle modification program aiming at achieving a minimum of 160 minutes of aerobic physical activity per week and a moderate reduction in caloric intake which aimed at improving overall nutritional quality.

Results: At baseline, the correlation coefficient between the two fitness measurements was $r=-0,33$, $p=0,0003$. The weighted Cohen Kappa coefficient was 0,37 (95% CI = 0,18-0,56), which suggests a weak to moderate agreement to identify unfit individuals (bottom quartile of each measurement) based on both methods. Following the intervention, men improved their fitness levels. At the end of the study, max and submax exercise capacity tests were again weakly correlated ($r=-0,23$, $p=0,04$). However, waist circumference was similarly associated with max and submax exercise capacity tests at follow-up ($r=-0,30$, $p=0,007$ and $r=0,42$, $p<0,001$, respectively for max and submax tests). However, only the submax fitness measurement was correlated with insulin levels at two-hours during the OGTT ($r=-0,34$, $p=0,003$).

Conclusion: Although maximal and submaximal tests are not interchangeable to screen for unfit individuals, both tests could be used to monitor changes in the cardiometabolic risk profile following a lifestyle modification program in abdominally obese men.

Session 2: Physical Activity/Exercise

85-hJ4d-204

THE 'GRAND DÉFI PIERRE LAVOIE': PUTTING THE WHOLE PROVINCE OF QUÉBEC ON THE MOVE!*Véronic Tremblay¹, Maggie Vallières¹, Jean-Pierre Després¹, Natalie Alméras¹**¹Centre de recherche de l'Institut universitaire de cardiologie et de pneumologie de Québec*

Objective: To document the adhesion of schools and the reach of the "Grand défi Pierre Lavoie" (GDPL), the largest organization promoting physical activity and a healthy lifestyle, in the Province of Québec (PQ).

Methods: To achieve its goal, the GDPL, a not-for-profit organization, has partnered with Québec schools to help kids make healthier choices in their everyday lives, to acquire healthier lifestyle habits (physical activity and healthy eating) that will become the norm for future generations. Every month of May since 2009, children could take part in a friendly contest among elementary schools across Québec which were all invited to participate. The contest aimed at rewarding students who make the strongest commitment to becoming more physically active. To participate, children and their families must perform 15-minute sessions of physical activity, called "Energy Cubes", 7 days a week, for a month. For each 15-minute session, they earn one Energy Cube. These Cubes (points) are entered on the official GDPL website by physical education teachers or the person in charge in each participating school. Parents were responsible for signing their children's reports confirming the number of Cubes that were performed at home whereas the schools' staffs compiled the Energy Cubes performed during school time.

Results: In 2009, 15% of the schools of the PQ participated in the challenge. During that initial year, schools from every administrative region were involved with the exception of Northern Québec (16/17 regions). Over its 6 years of existence, participation rate kept increasing, reaching nearly 50% of the schools in all 17 administrative regions. In 2014, Saguenay-Lac-St-Jean had more than 90% of its schools involved. In 2009, 16 million Energy Cubes were produced. This number doubled in 2010 to finally reach 91 million of Energy Cubes in 2014. Such energy output approximately corresponds to almost 23 million hours of physical activity, i.e., 14.5 hours/week for the 400,000 children with their families. It is important to mention that this initiative is attractive to all schools, irrespective of their socioeconomic environments.

Conclusion: The GDPL has become the largest societal movement promoting physical activity and healthy eating habits in the PQ.

Session 2: Population Health

85-Ps4g-263

AFTER EIGHT YEARS OF HEALTHY LIFESTYLE PROMOTION IN THE PROVINCE OF QUEBEC: WHERE DO WE STAND COMPARED TO INTERNATIONAL RECOMMENDATIONS?

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Objectives: Over the last years, a diversity of actions has been implemented in Quebec to prevent health issues related to diet, physical activity and weight. As a new national public health program is being formulated, we aimed to describe the efforts committed since 2006 in comparison to international recommendations, and to suggest priority areas for future action.

Methods: An exhaustive search of peer-reviewed and grey literatures was performed to assure a comprehensive overview of interventions implemented. 167 interventions were described via theory-based typologies documenting general characteristics, stakeholders involved and targets (individuals and/or physical, sociocultural, political and economic environments). The overall picture has been compared to evidence-based recommendations gathered from a meticulous selection of 58 references.

Results: Preliminary findings indicate that significant efforts have been engaged to develop intersectoral actions at provincial level and to support a myriad of community-based interventions, especially towards youth. Numerous interventions directly target individuals via information and education. Environments are also considered but, so far, interventions tend to focus more on policy development, empowerment, training, and toolkits than actual environmental changes. Coercive actions (e.g. food taxes, mandatory changes in school curricula) are less prominent although often recommended.

Conclusions: Salient points have been presented and challenged during a deliberative forum gathering 25 Quebec key stakeholders (civil servants, researchers, representatives of the civil society) on 15-16 December 2014 in Quebec City. After this event, the project team synthesized all the propositions formulated during the forum and invited the participants to fill an online survey aimed at identifying priority and most pertinent propositions. Overall conclusions from the state of play and the forum will be presented and discussed at the 5th ICCR Congress.

Session 2: Population Health

85-tKuC-263

CONSUMPTION OF SUGARY DRINKS AMONG TEENAGERS: RESEARCH PROTOCOL FOR A SYSTEMATIC REVIEW AND META-ANALYSIS OF ASSOCIATED FACTORS

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Objectives: Sugary drinks consumption contributes to excessive intake of sugar among teenagers, which is associated with many health problems such as heart disease, obesity, type 2 diabetes, hypercholesterolemia and tooth decay. The objective of this systematic review/meta-analysis is to identify key individual, environmental and organizational determinants of sugary drinks consumption among teenagers aged from 12 to 17.

Methods: A systematic review of experimental, quasi-experimental, pre-post, cross-sectional, surveys and cohort studies will be performed based on the Cochrane Handbook methodological recommendations. We will systematically search main health sciences databases such as PubMed, Embase, CINAHL, Cochrane Library, Embase, PsycINFO, as well as grey literature (e.g., ProQuest Dissertations and Theses) and reference lists of included studies. Studies conducted among teenagers and reporting associations between sugary drinks consumption and examined factors will be eligible for inclusion. Data will be collected on participant characteristics, study characteristics to assess methodological quality, measure of consumption, theoretical framework used, variables tested, significant determinants and statistical analyses. Theoretical determinants will be classified according to an adapted version of Cane's (2012) taxonomy of theoretical domains. Two independent reviewers will screen references, extract data using a standardized data extraction form and assess study quality with modified versions of The Cochrane Collaboration Tool. Association statistics (e.g., correlation coefficient, betas, OR, etc.) of the determinant-behavior link will be pooled using random-effect models and Mantel-Haenszel or the inverse variance methods in Review Manager. Pooled effect sizes and their 95% confidence intervals will be reported. Statistical heterogeneity will be assessed using the Cochran's Q-test and I² statistic. Risk of publication bias will be performed by visual examination of funnel plots. Sensitivity and subgroup analyses will be executed according to sex, type of sugary drink, and risk of bias.

Results: The results will be reported according the PRISMA guideline in peer-reviewed journals and conferences, and they will also be published in summary reports on public health organization websites.

Conclusions: This systematic review will allow identification of targets for public health interventions that aim to successfully decrease sugary drinks consumption among teenagers and thus prevent obesity-related diseases such as type 2 diabetes in adulthood.

Session 2: Population Health

85-WgDW-134

IDEAL CARDIOVASCULAR HEALTH PROFILE OF 10 YEAR OLD CHILDREN FROM A QUEBEC BIRTH COHORT*Beatrice Nikiema¹, Lise Gauvin¹**¹Centre hospitalier de l'université de Montréal (CRCHUM)*

Objectives: The American Heart Association proposed a promising set of metrics for the measurement of “ideal” cardiovascular health (ICVH) based on seven components including weight, glycaemia, cholesterol, blood pressure, smoking, diet, & physical activity. The objectives of this study were to estimate the prevalence of ideal cardiovascular health metrics among 10 year old Quebec youths and to examine associations with socioeconomic status.

Methods: Data were from 1334 youths who participated to the 2008 follow-up of the Quebec Longitudinal Study of Child Development, a birth cohort started in 1998. We estimated the prevalence of measured weight status (<85th sex- and age- appropriate percentile), blood pressure (<90th sex- & age- appropriate percentile), glycaemia (<5.6 mmol/l), and total cholesterol (<4.4 mmol/l) as well as self-reported smoking (never tried), diet (fruits & vegetables \geq 5 times per day), and physical activity (\geq 15 mn every day & vigorous activity 3 times per week). Logistic regressions established associations of ICVH metrics with socioeconomic status ((<low-income cut-off & quintiles of Willms' Index) controlling for child's sex and birth rank, and the mother's age at child birth, and immigration status. Multiple imputations were applied to reduce risk of biased estimates.

Results: Prevalence of ideal standards was 67% for weight, 93% for blood pressure, 95% for fasting glycaemia and 57% had for cholesterol level. 96% never tried smoking, 23% consumed fruits and vegetables more than 5 times per day, and 22% did recommended physical activity. Only 7% met ideal standards for all the seven components. Children from low-income families were less likely to smoke, eat fruits and vegetables 5 times per ($p=0.016$), and be physically active ($p=0.012$). Adjusted probabilities were lower by 8.06 to 12.29 percentage points in children of low-income compared to those in medium-high income families and by 9.81 to 15.44percentage points in the deprived quintiles compared to the richest quintile of the Willms' Index. Findings were similar across nonimputed and imputed data sets.

Conclusions: Few children meet standards for ideal cardiovascular health and living in deprived conditions is associated with a lower opportunity for achieving ideal cardiovascular health.

Session 2: Prevention

85-WgDW-134

THE SOCIAL GRADIENT OF CHRONIC DISEASE RISK: EXAMINING FACTORS CONTRIBUTING TO METABOLIC SYNDROME*Deepa P. Rao¹, Heather Orpana¹, Daniel Krewski¹**¹University of Ottawa*

Objectives: Metabolic syndrome (MetS) is a risk condition associated with higher odds of leading chronic conditions such as diabetes and cardiovascular diseases. Risk factors for MetS include those that fall under the material, behavioural and psychosocial paradigm. Indeed, a social gradient of MetS has been previously described linking lower income and educational status with higher odds of MetS. This paper seeks to explore whether behavioural and psychosocial factors mediate this social gradient.

Methods: The Canadian Health Measures Survey was used to examine mediation pathways that relate socioeconomic status (SES) with MetS in Canadian adults ages 18 and over. The association of (i) SES with MetS, (ii) SES with behavioural and psychosocial risk factors, and (iii) behavioural and psychosocial risk factors with MetS were used to identify possible mediators of the social gradient of MetS. Logistic and multinomial regression, and standardization of logistic coefficients were used to identify possible mediators and calculate percent reductions in MetS associated with them.

Results: A social gradient in metabolic syndrome exists in the Canadian adult population. Psychosocial risk factors were not identified as mediators of this gradient. However, the behavioural risk factors of alcohol use, sleep, physical inactivity, and screen time were found to mediate this pathway. Relative to the highest level, these mediators account for 26% and 53% of the social gradient according to income adequacy levels, and to 20% and 4% of this relationship across education levels.

Conclusion: Disparities in metabolic syndrome exist in Canadian adults according to income adequacy and education status. These disparities may be accounted for by patterns in alcohol use and various measures of physical inactivity.

Session 2: Thrombosis

85-WyE3-293

DIFFERENCES IN PLASMA PAI-1 LEVELS AFTER WEIGHT LOSS SURGERY IN OBESITY AND TYPE 2 DIABETES

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Objectives: Obesity and type 2 diabetes are associated with a suppression of fibrinolysis and thereby an increased risk of intravascular thrombi due to elevated levels of plasma Plasminogen Activator Inhibitor-1 (PAI-1). The source and the complex regulation of PAI-1 in these conditions are unclear. The aim of the present study was to investigate whether plasma PAI-1 levels decrease after gastric bypass surgery in an early phase prior to weight loss, or exclusively in the late phase after weight loss, in order to elucidate the importance of fat mass vs other mechanisms (i.e. glycemic control) for the PAI-1 levels. Furthermore, due to the higher risk of thromboembolic events in diabetes differences in PAI-1 levels between diabetic and non-diabetic obese subjects were studied.

Methods: Plasma PAI-1 was measured by ELISA in six morbidly obese subjects with diabetes and six morbidly obese non-diabetic subjects; pre, 4 and 42 days after gastric bypass surgery.

Results: In the immediate post-operative period plasma PAI-1 was significantly decreased; 122.8 ± 172.3 ng/ml preoperatively to 57.9 ± 89.4 ng/ml on day 4 ($P=0.023$). There was a significant difference in plasma PAI-1 between diabetic subjects and non-diabetic subjects in late phase ($P=0.005$). In non-diabetic subjects plasma PAI-1 levels decreased significantly in both early and late phase. In diabetic subjects plasma PAI-1 levels decreased in early phase and surprisingly increased in late phase, however this was not significant.

Conclusions: Plasma PAI-1 is significantly decreased before any weight-loss after gastric bypass surgery. The results show that a large fat mass is not merely the cause of the PAI-1 levels. Interestingly, there is a difference in plasma PAI-1 levels between diabetic and non-diabetic subjects after gastric bypass and since PAI-1 may be a marker of increased risk of both cardiovascular events and venous thromboembolism further studies are crucial in order to elucidate the precise mechanisms.

Session 2: Weight Loss

85-Bumf-293

IMPACT OF A 12-WEEK SUPERVISED PHYSICAL ACTIVITY PROGRAM AFTER BARIATRIC SURGERY ON BODY COMPOSITION, BODY FAT DISTRIBUTION AND ON DAILY PHYSICAL LIFESTYLES CHANGES; A RANDOMIZED STUDY

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Objective: To measure the impact of a 12-week supervised physical activity program, between months 3 to 6 after bariatric surgery, on body composition, body fat distribution and on daily physical activity in morbidly obese patients.

Methods: Patients were randomized either in a supervised physical activity program group (exercise group) or either usual care group (control group). Anthropometric measurements, abdominal and mid-thigh computed tomography scan (CT scan) and measure of daily physical activity with a accelerometer were performed before, at 3 and 6 months after bariatric surgery.

Results: Up to now, 55 patients are included in the study. So far, 31 patients (20 patients in the exercise group and 11 patients in the control group) have completed 6 months follow-up. At baseline, both groups were similar. During the exercise period, between months 3 to 6, there was a trend ($p < 0.10$) toward a greater reduction in weight (-14.1 ± 6.2 vs. -11.7 ± 5.6 kg), visceral adipose tissue (VAT) (-456.8 ± 236.8 vs. -345.8 ± 160.7 cm³) and a lower reduction mid-thigh muscle (0.9 ± 6.0 vs. -3.3 ± 5.2 %) in the exercise group compared to the control group. In the exercise group, change of VAT is positively associated with the increase of time spent in moderate-to-vigorous physical activity ($r = 0.70$; $p = 0.02$) and negatively related to time spent in sedentary activity ($r = -0.85$; $p = 0.004$). In the control group, change of VAT is positively associated with the increase of time spent in total physical activity ($r = -0.84$; $p = 0.003$) and with the increase of daily steps ($r = 0.65$; $p = 0.04$). Mid-thigh muscle preservation in the exercise group is strongly associated with time spent in light activity ($r = 0.77$; $p = 0.10$) in comparison to control group where the changes in mid-thigh muscle is associated with time spent in sedentary activity ($r = 0.64$; $p = 0.04$).

Conclusion: Our complete data in 31 patients suggested a trend toward a favorable impact of exercise regarding a greater decrement in weight and VAT and a lower decrement in mid-thigh muscle. Also, our data showed the impact of high daily physical lifestyle related in favorable outcomes for body composition and body fat distribution. More patients are being studied to further delineate the effect of supervised physical activity program.

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The European Healthy Lifestyle Alliance

**EAT DRINK
WELL WELL
MOVE**



The European Healthy Lifestyle Alliance (EHLA), an initiative of the International Chair on Cardio-metabolic Risk (ICCR), is an international, scientifically based, multidisciplinary and independent not-for-profit association based in Brussels, Belgium. The platform is gathering “friends” from various fields in health, nutrition, physical activity, consumers, politics and science, encouraging debate on lifestyle issues at the European level. The association wishes to work with the European institutions and stakeholders as a consultative body, giving access to the scientific expertise of the ICCR. EHLA is providing the European decision-makers with scientific evidence on the impact of obesity and related health risks and the need for lifestyle changes. Together with all other stakeholders, EHLA wants to formulate actions and recommendations on what the EU and its citizens - and we as professionals - can do jointly to stop the epidemic of abdominal obesity.

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