ABSTRACT

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ORAL PRESENTATION SESSION

OP1-1
UNACYLATED GHRELIN PLASMA LEVELS DECREASE WITH BODY MASS AND PREDICT 5-YEAR LOW MUSCLE MASS IN THE ELDERLY

G. Gortan Cappellari[1], A. Semolic[1], P. Vinci[1], M. Ius[1], M. Zanetti[1], R. Barazzoni[1]

[1]*Department of Medical, Surgical and Health Sciences, University of Trieste, Trieste, Italy*

Background Aging is associated with skeletal muscle loss, which may be paralleled by increased fat mass, both contributing to increased frailty and healthcare and social costs. Unacylated ghrelin (UnAG) is an emerging modulator of skeletal muscle metabolism with potential muscle-anabolic actions, and plasma UnAG decreases with overweight-obesity [body mass index (BMI) > 25 kg/m^2] in general population cohorts. Potential associations between overweight-obesity, muscle mass (MM) and UnAG in the elderly are unknown.
Methods We investigated associations between body mass index (BMI) and ghrelin profile [total (TG), acylated (AG) and unacylated hormone (UnAG)] in 450 elderly individuals (age > 65 years) from the North-East Italy MoMa population study (M/F: 179/271). After 5 years the MM index (MM/m^2) was measured in 133 subjects (M/F: 72/81) by bioelectrical impedence analysis. Low MM-index was defined as 2 standard deviations lower than average MM-index in young (18–39) reference subjects from the same population.
Results In elderly individuals, UnAG was reduced (p < 0.01) in overweight-obese compared to lean. In multiple regression analysis, UnAG was associated (P < 0.01) with BMI independently of potential confounders, including gender, metabolic and inflammatory markers. In logistic regression analysis, lower basal UnAG predicted (p < 0.05) low MM-index independently of BMI, gender and metabolic confounders.
Conclusions In elderly subjects from a North-East Italy general population cohort, unacylated ghrelin is lower in overweight-obese individuals and it predicts 5-year muscle mass independently from BMI. The current results suggest that UnAG levels may contribute to muscle mass in obese elderly individuals.

OP1-2
PANCREAS, LIVER AND MUSCLE LIPID CONTENT IN SUBJECTS WITH SARCOPENIC OBESITY

G. Stabile[1], L. Delmonte[1], A. ROSSI[1], G. Vantini[1], S. Pennacchio[1], A. De Massari[1], M. De Girolamo[1], S. Berti[1], J. Bonafini[1], S. Urbani[1], E. Zoico[1], M. Zamboni[1]

[1]*University of Verona Verona*

The aim of the present study was to determine liver, pancreas, and psas lipid content, body fat distribution and fat intake in men and women affected by obesity with and without sarcopenia 80 obese subjects with mean age 51.6 ± 11.8 years and mean BMI 34.7 ± 3.7 kg/m^2 were studied. Weight, height, BMI, waist circumference, as well as HOMA index, cholesterol, triglycerides, high-density lipoprotein cholesterol, high sensitivity C-reactive protein, daily energy intake and macronutrient distribution. Fat mass and appendicular lean mass were assessed by dual energy X-ray absorptiometry (DXA), and ALM/BMI was calculated according to FNIH definition for sarcopenia. Magnetic resonance was used to evaluate visceral (VAT), subcutaneous adipose tissue (SCAT) as well as liver, pancreas and psoas lipid content using in-phase and out-of-phase magnetic resonance imaging (MRI) sequence. Psoas muscle area was also calculated.

Subjects with sarcopenic obesity were defined according to FNIH proposed cutoff for ALM/BMI, < 0.789 for men and < 0.512 for women. Subjects with sarcopenic obesity had significantly higher BMI, waist circumference, FM, FM%, SCAT, Deep SCAT, VAT, liver, pancreatic and psoas lipid content than non sarcopenic subjects and lower psoas muscle area. Moreover, higher level of glycemia, HOMA index, hs-CRP, triglycerides and lipid intake and lower protein intake were observed in subjects with sarcopenic obesity.

Subjects with sarcopenic obesity show higher ectopic fat deposition as compared to non sarcopenic. This condition can be determined by lower protein intake and higher lipid consumption and lead to unfavorable metabolic profile with diabetes, hypertriglyceridemia and subclinical inflammation.

OP1-3

DIETARY INFLAMMATORY INDEX IS DIFFERENTLY ASSOCIATED WITH ECTOPIC FAT DEPOTS IN OVERWEIGHT AND OBESE ADULTS

E. Poggiogalle[1], F. Frigerio[1], C. Lubrano[1], F. Luisi[1], J. R. Hebert[2], N. Shivappa[2], M. Di Martino[3], L. Gnessi[1], S. Mariani[1], A. Lenzi[1], L. M. Donini[1]

[1]Department of Experimental Medicine, Sapienza University, Rome, Italy, [2]University of South Carolina, Columbia, South Carolina, United States, [3]Department of Radiological Sciences, Sapienza University, Rome, Italy

Introduction In overweight and obesity energy unbalance is responsible for the accumulation of ectopic fat. Excess energy and metabolic alterations, namely insulin resistance, may favor ectopic fat depositions. However, the role played by dietary factors, especially the pro-inflammatory properties of dietary patterns, in ectopic fat storage is not thoroughly understood. The aim of our study was to investigate the association between the Dietary Inflammatory Index (DII) and different ectopic fat depots.

Methods Participants were recruited among subjects admitted to the High Specialization Centre for the Care of Obesity (CASCO), at the Sapienza University, Rome, Italy. Inclusion criteria were: age 18–75 years, body mass index (BMI) ≥ 25 kg/m^2. The intrahepatic lipid content (IHL) and the intramyocellular lipid content (IMCL) were assessed through magnetic resonance spectroscopy, whereas intermuscular adipose tissue (IMAT, as adipose tissue between skeletal muscle bundles and beneath the muscle fascia), visceral and subcutaneous adipose tissue (VAT and SAT) were evaluated by magnetic resonance imaging. 3-day dietary records were administered and analyzed by a registered dietician. The DII score (adjusted for energy density) and the HOMA-IR were calculated. High-sensitivity C-reactive protein (hs-CRP) was measured.

Results 77 subjects (males: 18%) were included (age: 47.7 ± 13.5 years, BMI: 37.1 ± 5.7 kg/m^2). The DII score was positively associated to IHL (beta: 0.221, SE: 0.101, p = 0.03) and IMAT (beta: 0.140, SE: 0.066, p = 0.04) after adjustment for age, sex, hs-CRP levels, HOMA-IR, and VAT. No associations emerged between DII score and IMCL or VAT, or SAT.

Conclusion A more pro-inflammatory dietary pattern is associated with fatty liver, and intermuscular adipose tissue, but it does not seem to affect intramyocellular lipid storage.

OP1-4

OBESITY AND BONE: SIRT1 AND SCLEROSTIN, A PATHOPHYSIOLOGICAL CONNECTION

R. Tozzi[1], D. Masi[2], S. Contini[2], M. E. Spoltore[2], A. Caputi[2], R. Risi[2], A. Balena[2], R. Rossetti[2], M. Watanabe[2], S. Basciani[2], C. Lubrano[2], L. Gnessi[2], S. Mariani[2]

[1]Dipartimento di Medicina Molecolare, "Sapienza" Università di Roma, [2]Dipartimento di Medicina Sperimentale, "Sapienza" Università di Roma

Background and objective SIRT1 is downregulated by the excess fat deposition while *SOST*—which encodes for sclerostin (SOST)—is associated to metabolic derangements. They intervene on the osteoblast differentiation and mineralization. The aim of our study was to evaluate SIRT1 and SOST plasma expression in relation to the degree of adiposity, biochemical indices of bone turnover, and bone characteristics in a male and premenopausal female population.

Materials and methods This cross-sectional study evaluated patients referring to the Day Hospital of the Policlinico Umberto I, "Sapienza" University of Rome. All subjects underwent clinical evaluation, biochemical routine assessment, dosage of osteocalcin, SIRT1 and SOST determined through a commercial kit (ELISA), and DXA scans body composition for evaluation of total-fat mass (FM)%, abdominal-visceral adipose tissue (VAT), lean mass, lumbar spine (L1-L4) BMD, femoral neck BMD and TBS.

Results 67 patients—of which 16 affected by anorexia nervosa (AN), 25 normal weight (NW) and 26 with obesity (OB)—were enrolled. FM% and lean mass, as well as lumbar spine and femoral neck BMD increased from AN to OB. The lowest TBS value was observed in OB compared to NW and AN (p < 0.05). While SIRT1 decreased with fat amount, SOST showed the opposite trend ($\rho = -0.318$; p = 0.009). SIRT1 had an inverse association with both femoral and lumbar BMD ($\rho = -0.276$, p = 0.025; $\rho = -0.404$, p < 0.01, respectively), whereas SOST had the opposite ($\rho = 0.432$, p < 0.01; $\rho = 0.28$, p = 0.024, respectively). Sex and age adjusted multivariate linear regression analyses showed that SIRT1 (ß = -0.258, p = 0.019) and osteocalcin (ß = -0.381, p = 0.008) were inversely correlated to L1–L4 BMD, contrarily to lean mass (ß = 1.140, p < 0.001) and FM% (ß = 0.926, p = 0.001). However, in BMI-stratified analyses, SIRT1 (ß = 0.655, p = 0.016) and lean mass (ß = 1.089, p = 0.019) were positive predictors of L1-L4 BMD in NW.

Conclusions Bone health is influenced by both metabolic parameters and mechanical loading. Our study showed an inverse association between circulating SIRT1 and SOST with an impact on cortical bone established by the degree of adiposity. SIRT1 seems to exert an advantageous influence on BMD in case of balanced adipose deposition.

OP1-5

THE TYPE 2 DEIODINASE THR92ALA DOES NOT AFFECT BARIATRIC SURGERY-INDUCED WEIGHT LOSS IN AN ITALIAN OBESE POPULATION

A. Bufano[1], N. Benenati[1], S. Cantara[1], C. Ciuoli[1], A. Tirone[2], C. Voglino[2], G. Vuolo[2], M. G. Castagna[1]

[1]Department of Medical, Surgical and Neurological Sciences, University of Siena, Siena, Italy Siena, [2]Department of Surgical Sciences, Bariatric Surgery Unit, University of Siena Siena

Background and aim Type 2 deiodinase is an intracellular enzyme which catalyses the conversion of thyroxine (T4) to its active form triiodothyronine (T3). A common single nucleotide polymorphism in the *DIO2* gene (Thr92Ala) has been identified in 12–36% of the general population and it was found to be associated with hypertension, type 2 diabetes mellitus (T2DM), insulin resistance, and body mass index (BMI). The aim of this study was to evaluate whether the *DIO2* Thr92Ala polymorphism was associated with severe obesity and response to bariatric surgery.

Methods We retrospectively evaluated 182 obese patients followed at the Unit of Endocrinology (University of Siena, Italy) and submitted to bariatric surgery from January 2011 to December 2019. Genomic DNA was extracted from peripheral blood leukocytes before surgery. Glycaemic control parameters, liver function, cardiometabolic biomarkers and hormonal parameters were assessed at baseline and after surgery.

Results There were 135 females (74.2%) and 47 males (25.8%). The mean age was 43 ± 11 years (range 18–68 years) and the mean BMI was 45.3 ± 7.0 kg/m^2 (range 33.9–78.9 kg/m^2). Based on genotype

evaluation, 78/182 (42.9%) patients were homozygous wild-type (Thr/Thr), 83/182 (45.6%) heterozygous (Thr/Ala), and 21/182 (11.5%) rare homozygous (Ala/Ala). Age at diagnosis was significantly lower in patients with *DIO2* Thr92Ala polymorphism (p = 0.03). No significant associations were observed between *DIO2* Thr92Ala polymorphism and BMI (p = 0.1), excess weigth (p = 0.07), waist circumference (p = 0.05) and homa index (p = 0.3). The prevalence of comorbidities was not associated with allele distribution. Excess weight loss (EWL) % at 6 and 12 months was not significantly different between wild-type patients, Thr/Ala and Ala/Ala group (p = 0.7 and p = 0.8, respectively). After bariatric surgery, hypertension, diabetes mellitus, dyslipidemia and metabolic syndrome were greatly reduced at 6 months and 12 months compared to baseline, without differences according to genotypes.

Conclusions The presence of *DIO2* polymorphism does not affect the severity of obesity, its complications and the response to bariatric surgery. However it seems to determine an earlier onset of morbid obesity.

OP1-6
CIRCULATING LEVELS OF 320 FAMILY MICRORNAS IN SUBJECTS WITH LIPODYSTROPHY: DISCLOSING NOVEL SIGNATURES OF THE DISEASE

A. Dattilo[1], G. Ceccarini[2], G. Scabia[3], S. Magno[2], L. Quintino[2], C. Pelosini[4], G. Salvetti[2], M. Costa[5], F. Santini[2], M. Maffei[6]

[1]Scuola Superiore Sant'Anna Pisa, [2]Dip Medicina Clinica e Sperimentale Pisa, [3]IFC-CNR Pisa, [4]AOUP Pisa, [5]IN-CNR and Scuola Normale Superiore Pisa, [6]IFC-CNR e Dipartimento di Medicina Clinica e Sperimentale Pisa

Lipodystrophy (LD) designates a heterogeneous group of rare disorders characterized by generalized or partial loss of subcutaneous white adipose tissue (WAT), of genetic or acquired origin, often associated with metabolic derangements. WAT is an important source of circulating micro RNAs (miRNAs) and working hypothesis of the present study is that LD can result in altered concentration of specific miRNAs in the blood (cmiRNAs). miRNome profiling on plasma samples from a selected group of LD subjects and controls allowed to identify 5 cmiRNAs from 320 family (a-3p, b, c, d, e) as differentially expressed. Validation studies executed by quantitative PCR in a larger cohort of subjects (36 LD, 23 CNT) established: (i) significantly altered 320 cmiRNAs in LD subjects with a-3p, b, c, e being upregulated and d downregulated; (ii) variable extent of the difference depending on the category of LD with the most significant variation found in the subtype Familial Partial Lipodystrophy 2 and no change in Familial Partial Lipodystrophy 1; (iii) the power of the classifier to distinguish between affected and not affected individuals is improved when instead of one single member of the 320 family we combine as a sum the expression of cmiRNAs 320a-3p, 320b and 320c (AUC ROC curves 0.86, P < 0.0001). Within the miRNA 320 family cmiRNA 320a-3p showed multiple significant inverse relationships with clinical parameters, among others: BMI (P = 0.0001), Glucose (P < 0.0001) cholesterol (P = 0.001), plasma leptin (P = 0.0003). Gene ontology search performed on miRNA targets indicates cell–cell adhesion as a process putatively regulated by 320 miRNAs.

In conclusion circulating levels of 320 miRNAs constitute novel biomarkers of LD, with variable capacity to be a disease classifier in the different LD subtypes.

OP2-1
VISCERAL ADIPOSE TISSUE INFLAMMATION AND FAT EMBOLISM IN COVID-19 PATIENTS WITH OBESITY: A HISTOMORPHOLOGIC CROSS-SECTIONAL STUDY

G. Colleluori[1], L. Graciotti[2], P. Mauro[3], A. Di Vincenzo[1], J. Perugini[1], E. Di Mercurio[1], S. Caucci[4], P. Bagnarelli[4], S. Menzo[4], A. Tagliabracci[3], M. C. Zingaretti[1], E. Nisoli[5], C. Dani[6], A. Ladoux[6], A. Giordano[1], S. Cinti[1]

[1]Medicina Sperimentale e Clinica, Università Politecnica delle Marche Ancona, [2]Scienze Cliniche e Molecolari, Università Politecnica delle Marche Ancona, [3]Bioscienze e Sanità pubblica, Sezione medicina legale, Università Politecnica delle Marche Ancona, [4]Bioscienze e Sanità pubblica, sezione microbiologia, Università Politecnica delle Marche Ancona, [5]Biotecnologie Mediche e Medicina TraslazionaleUniversità degli Studi di Milano Milano, [6]Istitut de Biologie Valrose Nizza, Francia

Obesity is a critical determinant of severe coronavirus disease 2019 (COVID-19), as it increases complications and mortality following SARS-CoV2 infection. Studies characterizing features underlying such association are extremely urgent. In this cross-sectional study, we performed a comprehensive histomorphologic analysis of lung, liver and visceral adipose depots (VAT) of 19 patients dead for COVID-19 and 23 subjects dead for other reasons. Mean age was 63 ± 14 years and BMI was 29.0 ± 5.4 kg/m^2. Although there were no differences in BMI and adipocytes area between COVID-19 and control patients, we observed higher prevalence of CD68 + macrophages in the VAT of the former compared to the last $(4.25 \pm 2.1$ vs 8.08 ± 5.60 CD68 + cells/10 adipocytes; p = 0.005) suggesting higher VAT inflammation following SARS-CoV2 infection. Since VAT inflammation is strongly associated with lipids spill-over from dying adipocytes, we studied lipids presence and distribution in lung and liver of the same patients employing Oil Red-O staining (ORO). Lipids were widely distributed in the lung and liver of COVID-19 patients and were evidenced not only within endothelial cells, macrophages and interstitial spaces, but also inside vessels' lumen, a feature suggestive of fat embolism syndrome (FES), detected in all COVID-19 patients and 53% of controls (p < 0.001). Signs of FES were more prevalent among patients with obesity (93%vs63%, p = 0.03), suggesting that such condition may be peculiar of the disease independently of COVID-19. Interestingly, all COVID-19 patients lungs presented hyaline membranes (HM), which seemed to be lipidic in nature based on ORO. Lastly, to evaluate whether the elevated VAT inflammation among COVID-19 patients could be related to the ability of SARS-CoV2 to infect adipocytes, we infected hMADS brought to differentiation. SARS-CoV2 was revealed in both, cell pellet and supernatant 96 h post-infection, timepoint at which adipocytes displayed lower cell viability, pyknotic nuclei and clear signs of death.

Collectively, these data suggest that obesity and VAT inflammation in the context of COVID-19 may result in FES and HM formation, contributing to the negative prognosis documented in this population, and that such phenomenon may be possibly due to obesity-induced adipocytes death, worsened by SARS-CoV2.

OP2-2
CLASS SPECIFIC RESPONSES OF BROWN ADIPOSE TISSUE TO FINERENONE AND SPIRONOLACTONE IN A MOUSE MODEL OF DIET-INDUCED OBESITY

V. Marzolla[1], A. Feraco[1], S. Gorini[1], C. Mammi[1], P. Kolkhof[2], A. Armani[3], M. Caprio[3]

[1]Laboratory of Cardiovascular EndocrinologIy, IRCCS San Raffaele Roma Rome, [2]Bayer AG, R&D Preclinical Research Cardiovascular Wuppertal, [3]Department of Human Sciences and Promotion of the Quality of Life, San Raffaele Roma Open University Rome

Background/introduction Obesity and metabolic syndrome represent major public health concerns. Aldosterone (Aldo) exerts deleterious

effects on the cardiovascular system and increases cardiovascular risk, promoting adipose tissue expansion via Mineralocorticoid Receptor (MR) activation. Treatment with mineralocorticoid receptor antagonists (MRAs) has been shown to improve clinical outcomes in patients with heart failure. Moreover, we previously demonstrated that administration of steroidal MRAs in mice fed a moderate high fat diet (45% kcal from fat, HFD) is able to reduce white adipose tissue (WAT) expansion, stimulating browning of WAT and activating interscapular brown adipose tissue (iBAT). In this study we aimed to compare the effects of steroidal MRA Spironolactone (Spiro) versus the novel non-steroidal MRA Finerenone (Fine) on AT in a mouse model of HFD-induced obesity.

Methods Male 10-week old C57BL/6J mice were fed a very HFD (60% kcal as fat) or a very HFD containing Spiro (0.165 g of Spiro per kg of diet) or Fine (0.1 g of Fine per kg of diet) for 12 weeks. Metabolic parameters, adipose tissue morphology as well as gene and protein expression analysis were assessed.

Results After 3 months of treatment, in C57BL/6J male mice fed a very HFD (60% kcal from fat), Fine showed more efficacy than Spiro to improve insulin resistance. Given the role of MR in regulating AT, we performed histological and molecular analyses in these tissues. Histological and molecular analysis of WAT did not show significant differences among all experimental group; differently, iBAT histological analysis showed that Fine was able to increase recruitment of brown adipocytes. These findings were confirmed by gene expression analysis of brown adipocyte markers, showing a significant increase in iBAT of HFD + Fine group compared to HFD + Spiro group.

Conclusion(s) We demonstrated that Fine displays a higher efficacy, compared to the steroidal MRA Spiro, to antagonize the deleterious effects of MR hyperactivation in mouse models of diet-induced obesity. Indeed, Fine could represent a novel pharmacologic approach to treat human metabolic diseases associated to adipose tissue dysfunctions.

OP2-3

AMELIORATION OF PRESSURE OVERLOAD-INDUCED HEART FAILURE BY EAA-ENRICHED DESIGNER DIET: IMPROVED METABOLIC FLEXIBILITY AND ACETYLATION OF MITOCHONDRIAL PROTEINS

M. Ragni[1], C. Ruocco[1], F. Rossi[1], L. Tedesco[1], M. O. Carruba[1], A. Valerio[2], E. Nisoli[1]

[1]Dipartimento Biotecnologie Mediche e Medicina Traslazionale Milano, [2]Dipartimento di Medicina Molecolare e Traslazionale Brescia

Metabolic alterations in obesity and its associated diseases are also major hallmarks of heart failure (HF), with reduced mitochondrial substrate oxidation underlying the metabolic remodelling of the failing heart. Recently, we showed that a diet rich in saturated fatty acids (SFA diet), in which casein, the primary protein source in rodent diet, was substituted with a specific mixture of soluble essential amino acids (SFA-EAA diet) both prevented and improved HF with reduced ejection fraction (HFrEF) in mice. To further explore the mechanism responsible for the positive effects of the SFA-EAA diet on HFrEF, we performed an unbiased metabolomic analysis in the left ventricles of mice subjected to sham or transverse aortic constriction (TAC) surgery. A total of 146 and 155 out of 572 metabolites were significantly regulated in response to the SFA-EAA diet in sham- and TAC-operated mice, respectively; notably, the SFA-EAA diet restored the levels of 88% and 69% metabolites, up- and down-regulated, respectively, in the failing heart. Glycolysis, amino acid and fatty acid metabolism were among the pathways mainly affected by TAC and restored by SFA-EAA diet. Glycemic and insulin tolerance of TAC mice fed with the SFA-EAA diet reflected these effects. Noticeably,

SFA-EAA diet reverted the decrease in cardiac acylcarnitine levels in the SFA-TAC animals, indicating an improvement of mitochondrial fatty acid oxidation and Acetyl-CoA handling. Accordingly, carnitine acetyltransferase (CraT) activity decreased in control SFA-TAC mice and was reinstated by the SFA-EAA diet, which also normalized the hyperacetylation of mitochondrial proteins in SFA-TAC mice. In line with the increased mitochondrial substrate utilization flexibility, SFA-EAA diet also increased mitochondrial pyruvate oxidation in TAC-operated mice. Therefore, these data indicate that a dietary approach positively affect the compromised cardiac mitochondrial metabolism of HFrEF toward a therapeutic outcome.

OP2-4

CHANGES OF ADIPOSE TISSUE ARCHITECTURE IN PATIENTS WITH OBESITY BEFORE AND AFTER WEIGHT LOSS

C. Compagnin[1], S. Conci[1], F. Favaretto[1], M. Sanna[1], A. Belligoli[1], R. Fabris[1], C. Dal Prà[1], S. Bettini[1], M. Foletto[1], L. Prevedello[1], C. Da Re[2], C. Mescoli[3], V. Vindigni[4], L. Busetto[1], R. Vettor[1], G. Milan[1]

[1]Center for the Study and the Integrated Treatment of Obesity, Department of Medicine, University of Padova Padova, [2]Division of General Surgery, Department of Surgical, Oncological and Gastroenterological Sciences, University of Padova Padova, [3]Surgical Pathology and Cytopathology Unit, Department of Medicine, University of Padova Padova, [4]Clinic of Plastic and Reconstructive Surgery, Department of Neurosciences, University of Padova Padova

Background Obesity is characterized by the progressive expansion of adipose tissue (AT) by hypertrophy and hyperplasia involving adipose and endothelial precursor cells. We analysed morphological and functional changes of subcutaneous and visceral AT (SAT and VAT) of patients with obesity before and after weight loss compared to lean controls.

Methods SAT and VAT samples were collected from 15 normal weight non-diabetic controls (NW), 63 non-diabetic patients with obesity (OB) and 29 weight-loss subjects (WL) underwent bariatric surgery or diet therapy. Clinical data, anthropometric measurements and biochemical parameters of patients were collected. Adipocyte size and capillary density were measured by IHC. Stromal vascular fraction freshly isolated was characterized by cytometry, quantifying AT stem cells (ASCs) (CD45−/34+/31−) and endothelial progenitors (CD45−/31+/34+), and by the evaluation of in vitro adipogenic potential.

Results Both SAT and VAT median adipocyte area was higher in OB compared to NW and decreased in WL to control levels. The capillary density was lower in OB compared to NW in both AT depots and increased in WL. SAT adipocytes were larger that VAT ones in all groups and capillary density was higher in VAT than in SAT. OB showed a significant ASCs enrichment compared to NW in both AT depots and SAT-ASCs further increased in WL. The phenotype of ASCs changed in WL decreasing the expression of both CD105 and CD271 membrane markers. The percentage of endothelial progenitors was higher in SAT than in VAT, increased with obesity in both depots and decreased in SAT of WL reaching the levels of NW.

Conclusions Our results showed a remodelling of AT architecture after weight loss with the increase of ASCs and capillary number and a size reduction of mature adipocytes. These data could provide a biological understanding of how stem cell scaling is maintained during AT growth suggesting a possible explanation for the recurring weight regain.

OP2-5

MATERNAL HIGH-FAT FEEDING AFFECTS THE LIVER AND THYMUS METABOLIC AND IMMUNE AXIS IN THE OFFSPRING AND SOME EFFECTS ARE ATTENUATED BY MATERNAL DIET NORMALIZATION IN A MINIPIG MODEL

F. La Rosa[1], L. Guiducci[1], M. A. Guzzardi[1], A. Cacciato Insilla[2], S. Burchielli[3], M. R. Brunetto[4], F. Bonino[5], D. Campani[2], P. Iozzo[1]

[1]Institute of Clinical Physiology, National Research Council (CNR) Pisa, [2]Department of Surgical, Medical, Molecular Pathology and Critical Care Medicine, Division of Pathology, Pisa University Hospital Pisa, [3]Gabriele Monasterio Foundation Pisa, [4]Hepatology Unit and Laboratory of Molecular Genetics and Pathology of Hepatitis Viruses, Pisa University Hospital Pisa, [5]Institute of Biostructure and Bioimaging, National Research Council (CNR) Napoli

Maternal obesity adversely impacts metabolic and immune development. We aimed to characterize the effects of maternal obesity, and its subsequent normalization on liver and thymus metabolism in minipigs.

Offspring born to high-fat (HFD) and normal diet (ND) mothers were studied at week 1 and months 1, 6 and 12 of life. Liver and thymus glucose uptake (GU) were measured with positron emission tomography during hyperinsulinaemic–isoglycaemia. Histology of liver steatosis, inflammation and hematopoietic niches (HHN), and thymocyte size and density was done in a subset. The protocol was repeated after maternal diet normalization in the HFD group, with control mothers continuing on ND.

At birth, HFD_{off} (vs ND_{off}) were characterized by hyperglycaemia (8.3 ± 0.7 vs 6.6 ± 0.6 mmol/l), hyperinsulinemia (22.6 ± 7.8 vs 11.4 ± 2.9 mU/L), insulin resistance (IR) (2.3 ± 0.9 vs 5.9 ± 1.5 mg/(kg*min), $p < 0.05$), and high liver (0.38 ± 0.07 vs 0.18 ± 0.02 μmol/(ml*min), $p < 0.01$) and thymus GU (0.31 ± 0.07 vs 0.19 ± 0.02 μmol/(ml*min), $p < 0.05$), with liver steatosis (49 ± 14 vs $29 \pm 6\%$ cells affected, $p < 0.05$), followed by elevated weight gain (1.5 folds, $p < 0.01$), liver IR (0.15 ± 0.01 vs 0.23 ± 0.01 μmol/(ml*min), $p < 0.01$) and steatosis (60 ± 10 vs $14 \pm 11\%$, $p < 0.05$) in the first 6 months of life. Dietary normalization in HFD mothers reversed thymus and liver hypermetabolism, and increased HHN at birth (35.3 ± 14.9 vs 4.5 ± 0.7, $p < 0.001$). It also normalized systemic insulin sensitivity and liver fat content at all ages. Instead, weight gain excess, hyperglycemia and hepatic IR were still observed at 1 month, i.e., end-lactation. Males were more significantly and more persistently affected than females. Thymic GU was related to liver GU ($r = 0.75$, $p < 0.001$), thymocyte volume ($r = - 0.66$, $p = 0.004$) and liver hematopoietic niche number ($r = - 0.39$, $p = 0.04$).

Intra-uterine HFD exposure led to time-changing metabolic and immune correlated abnormalities. Maternal diet normalization reversed most, but not all the effects in the offspring.

OP2-6

HIGH-FAT DIET IMPAIRS MOUSE MEDIAN EMINENCE: A STUDY BY TRANSMISSION AND SCANNING ELECTRON MICROSCOPY COUPLED WITH RAMAN SPECTROSCOPY

I. Severi[1], G. Colleluori[1], M. Fosca[2], A. Di Vincenzo[1], J. V. Rau[2], A. Giordano[1]

[1]Medicina Sperimentale e Clinica Ancona, [2]Istituto di Struttura della Materia (ISM-CNR) Roma

Hypothalamic dysfunction is an initial event following diet-induced obesity, primarily involving areas regulating energy balance such as arcuate nucleus (Arc) and median eminence (ME). To gain further insights into the early hypothalamic diet-induced alterations, adult CD1 mice fed an high-fat diet (HFD) for 6 weeks were studied and compared with normo-fed controls. Transmission and scanning electron microscopy and histological staining were employed for morphological studies of the ME, while Raman spectroscopy was used for the biochemical analyses of the Arc-ME complex. In HFD mice, ME β2-tanycytes, glial cells dedicated to blood-liquor crosstalk, exhibited remarkable ultrastructural anomalies, including altered alignment, reduced junctions, degenerating organelles and higher content of lipid droplets, lysosomes and autophagosomes. Degenerating tanycytes also displayed an electron transparent cytoplasm, filled with numerous vesicles, and dilated extracellular spaces extending up to the subependymal layer. Consistently, Raman spectroscopy analysis of the Arc-ME complex revealed higher glycogen, collagen and lipid bands in HFD mice compared with controls, and higher band corresponding to the cyanide group in the former compared to the last. Collectively, these data show that ME β_2-tanycytes exhibit early structural and chemical alterations due to HFD and reveal for the first time hypothalamic cyanide presence following high dietary lipids consumption, a novel aspect with potential implications in the field of obesity.

OP3-1

EDMONTON OBESITY STAGING SYSTEM: AN IMPROVEMENT BY CARDIOPULMONARY EXERCISE TESTING

S. Bettini[1], G. Quinto[2], D. Neunhaeuserer[2], F. Battista[2], A. Belligoli[1], G. Milan[1], A. Gasperetti[2], R. Vettor[1], A. Ermolao[2], L. Busetto[1]

[1]Department of Medicine, Center for the Study and Integrated Treatment of Obesity, University of Padova Padova, [2]Department of Medicine, Sport and Exercise Medicine Division, University of Padova Padova

Background Different approaches are used to classify obesity severity. Beyond classical anthropometric measurements, the Edmonton Obesity Staging System (EOSS), considers medical, physical and psychological parameters. However, this method has some limitations, principally due to the absence of an objective measure for physical impairment. The aim of our study is thus to overcome this limitation suggesting a new functional parameter obtained by Cardiopulmonary Exercise Testing (CPET), i.e. Cardiorespiratory Fitness (CRF), expressed as weight-adjusted peak oxygen consumption (VO_2peak/kg).

Methods This observational cross-sectional study finally enrolled 500 subjects. Every patient underwent clinical, anthropometric, biochemical assessment and CPET. Firstly, participants have been classified according to standard EOSS in five stages. Secondly, patients were re-classified according to the new modified EOSS (EOSS-CRF) based on their age- and gender-appropriate VO_2peak/Kg percentiles as reported in the healthy normal-weight population of the FRIEND registry.

Results VO_2peak/Kg was significantly different between standard EOSS classes 1 and 2 and classes 1 and 3 (ANCOVA p model = 0.004), whereas patients in classes 2 and 3 showed similar CRF. The EOSS-CRF classification varied in number of patients in each class compared to EOSS, particularly for classes 2 and 3. Moreover, CRF showed that physical impairment is less addressed by EOSS when compared to EOSS-CRF.

Conclusions The integration of EOSS with CRF allowed to assign to each patient a severity index that considers not only clinical parameters, but also their functional impairment through a quantitative and prognostically important parameter (VO_2peak/kg). This improvement of the staging system may also provide a better approach to identify individuals at increased risk of mortality leading to targeted

therapeutic management and prognostic risk stratification for patients with obesity.

OP3-2

CARDIOMETABOLIC RISK IS UNRAVELED BY COLOR DOPPLER ULTRASOUND OF THE CLITORAL AND UTERINE ARTERIES IN WOMEN CONSULTING FOR SEXUAL SYMPTOMS

E. Maseroli[1], I. Scavello[2], S. Cipriani[2], V. Di Stasi[2], N. Verde[3], D. Menafra[3], S. Scannerini[4], S. Marchiani[5], G. Rastrelli[2], V. Ricca[4], F. Sorbi[6], M. Fambrini[6], F. Petraglia[6], M. Maggi[2], L. Vignozzi[2]

[1]Andrologia, Endocrinologia Ginecologia e Incongruenza di Genere, Azienda Ospedaliero-Universitaria Careggi Firenze, [2]Dipartimento di Scienze Biomediche, Sperimentali e Cliniche "Mario Serio", Università di Firenze Firenze, [3]Dipartimento di Medicina clinica e Chirurgia, Università di Napoli Napoli, [4]Unità di Psichiatria, Dipartimento di Neuroscienze, Psicologia, Area del Farmaco e Salute del Bambino, Università di Firenze Firenze, [5]Dipartimento di Medicina Sperimentale e Clinica, Università di Firenze Firenze, [6]Unità di Ginecologia, Dipartimento di Scienze Biomediche, Sperimentali e Cliniche "Mario Serio", Università di Firenze Firenze

Introduction Female sexual dysfunction (FSD) may be a mirror of a poor cardiometabolic state. In a small pilot study enrolling 71 women with FSD, we previously demonstrated that clitoral Pulsatility Index (PI) evaluated by using color Doppler ultrasound (CDU), reflecting vascular resistance, was associated with cardiometabolic risk factors.
Aim First, to confirm previously reported data on clitoral PI on a larger population; second, to investigate eventual similar correlations between cardiometabolic risk factors and CDU parameters of the uterine artery. We also ascertained whether uterine artery PI was directly related to body image uneasiness and psychopathological symptoms, assessed by validated questionnaires.
Methods N = 230 women consulting our clinic for sexual symptoms were examined with clitoral CDU and blood sampling and were asked to fill out the Female Sexual Function Index (FSFI), the Middlesex Hospital Questionnaire (MHQ) and the Body Uneasiness Test (BUT). In a subgroup of women (n = 164), we also performed transvaginal CDU with measurement of uterine artery parameters.
Results At multivariate analysis, we found a direct association between clitoral PI and BMI (p = 0.004), WC (p = 0.004), triglycerides (p = 0.006), insulin (p = 0.029) and HOMA-IR (p = 0.009). Furthermore, a correlation between obesity and MetS and a higher clitoral PI was observed (p = 0.003 and p = 0.012, respectively). Clitoral PI was also correlated with BUT-B PSDI (p = 0.010), a measure of body image concerns. Similarly, we were able to demonstrate an association between uterine artery PI and BMI (p < 0.0001), WC (p = 0.001), insulin (p = 0.006), glycated haemoglobin (p = < 0.0001), and HOMA-IR (p = 0.009). Women with obesity and MetS showed significantly higher uterine PI values vs. those without (p = 0.001 and p = 0.004, respectively). Finally, uterine PI was associated with body image dissatisfaction (BUT-A GSI, p < 0.0001).
Conclusion Vascular resistance of clitoral and uterine arteries is associated with cardiometabolic risk factors and body image concerns in women consulting for sexual symptoms. If further confirmed, our data could suggest CDU, a common examination method, as a useful tool for an identification of cardiometabolic risk factors.

OP3-3

THE FLORENCE EMOTIONAL EATING DRIVE (FEED): A VALIDATION STUDY OF A SELF-REPORT QUESTIONNAIRE FOR EMOTIONAL EATING

E. Cassiroli[1], C. M. Rotella[2], E. Rossi[1], V. Ricca[1], C. Cosentino[3], D. Scoccimarro[4], E. Mannucci[4], F. Rotella[5]

[1]Psychiatry Unit, Department of Health Sciences, University of Florence Largo Brambilla 3, 50134, Florence, Italy, [2]Department of Biomedical Experimental and Clinical Sciences University of Florence Florence, Italy, [3]Diabetology, Careggi Hospital Florence, Italy, [4]University of Florence Florence, Italy, [5]Psychiatry Unit, University of Florence and Careggi Teaching Hospital Largo Brambilla 3, 50134, Florence, Italy

Aims Emotional eating is a trans-diagnostic dimension in eating disorders and is present in many other conditions that could affect eating attitudes. At present, there is no instrument that measures emotional eating evaluating both the intensity and the frequency of emotion-induced desire to eat. The aim of the study was the validation of the Florence Emotional Eating Drive (FEED).
Methods A sample of healthy volunteers was initially enrolled to explore internal consistency and test–retest reliability. The Emotional Eating Scale (EES), Eating Disorders Evaluation-Questionnaire (EDE-Q), Binge Eating Scale (BES) and Symptom Checklist-90 (SCL-90-R), together with the final version of FEED, were administered to a clinical sample composed by patients with eating disorders, obesity, and type 2 diabetes, to explore the underlying structure of the questionnaire and verify its validity.
Results FEED showed excellent internal consistency (Cronbach's alpha = 0.96) and test–retest reliability (r = 0.93). FEED scores were higher in patients with BN and BED than in AN patients, negatively correlated with age and positively with BES and EES. Multiple regression analysis showed that FEED, but not EES, was independently associated with SCL-90-R and EDE-Q scores.
Conclusion FEED internal consistency and test–retest reliability were excellent. The addition of specific questions on the frequency of behaviours led to a better component structure and robustness compared to EES. A tool that reliably and specifically assesses eating behaviours driven by emotional states may be extremely useful in clinical settings.

OP3-4

ONLINE EDUCATION FOR OBESE PATIENTS IN COVID-19 PANDEMIA: PRELIMINARY DATA FROM THE EDON (EDUCATION ONLINE) STUDY

F. Santagiuliana [1], C. Cosentino[2], L. Pala[2], B. Cresci[2], E. Mannucci[3]

[1]Linea di Produzione dietetica e Nutrizione Florence Italy, [2]Diabetology, Careggi Hospital Florence Italy, [3]University of Florence Florence Italy

Aims Group behavioral therapy is one of the evidence-based treatments for obesity. During COVID19 pandemic we operated a sudden transition from in-person (IP) to online (ON) educational groups, using a platform made available by the Tuscan regional health service. The aim of the study is to demonstrate the non-inferiority of ON compared to IP groups in terms of weight loss at six months and number of drop-outs.
Methods The study enrolled 140 obese outpatients who attended either the ON educational groups (October 2020–February 2021) or the IP educational groups (January 2018–January 2019). In both cases, the program consisted of 6 weekly sessions focused on lifestyle modification, with the participation of about 10 patients at a time, led by a dietitian, an endocrinologist and a trained nurse. People attending

less than 4 sessions were considered as drop-outs. The structure of the online course was not changed in content, in order to better compare the two programs. Finally, we administered our patients a satisfaction questionnaire about the ON educational group.

Results At baseline, patients had a mean age 50.9 ± 13 years, a weight of 107.5 ± 20.7 kg and a BMI of 38.7 ± 5.9 kg/m². 78 patients were assigned to IP treatment and 62 patients to ON program. No significant difference in age, weight and BMI was observed between the two groups at baseline. 43 patients in the IP program (55.1%) and 56 patients in the ON group (90.3%) attended at least 4 sessions. Regarding the satisfaction questionnaire, 56.9% were satisfied with the program; 47.7% declared that the online mode made it possible their attendance and 60% said the course provided them the tools for lifestyle modification.

Conclusions In conclusion, our preliminary data show that the ON educational group has a significantly lower number of drop-outs. We are currently collecting data on medium-term effects on BMI and body weight. ON mode can be a useful tool for behavioral therapy, beyond COVID19 pandemia.

OP3-5
DEVELOPMENT AND INTERNAL VALIDATION OF A SCORING SYSTEM FOR PRE-SURGICAL AND EARLY POST-SURGICAL PREDICTION OF BARIATRIC SURGERY UNSUCCESS AT 2 YEARS

F. Bioletto[1], M. Pellegrini[1], C. D'Eusebio[1], S. Boschetti[2], F. Rahimi[2], A. De Francesco[2], S. Arolfo[3], M. Toppino[3], M. Morino[3], E. Ghigo[1], S. Bo[1]

[1]*Endocrinology, Diabetology and Metabolism, Department of Medical Sciences, University of Turin Turin,* [2]*Dietetic Unit, Città della Salute e della Scienza Hospital, Turin Turin,* [3]*Department of Surgical Sciences, University of Turin Turin*

Background Bariatric surgery (BS) is an effective treatment for morbid obesity. Determining the predictors of BS outcomes is a relevant issue. However, a simple and easy-to-use estimation tool for the prediction of BS unsuccess is still lacking.

Methods Baseline and follow-up data from 300 consecutive patients who underwent BS were retrospectively collected. BS unsuccess at 2 years was defined as a percentage of excess weight loss (%EWL) < 50%. Supervised regression and machine-learning techniques were used for model development.

Results Two scoring systems (NAG-score and ENAG-score) were developed and internally validated. The NAG-score, comprising only pre-surgical data, showed an AUC = 0.713 and was structured on a 4.5-point-scale (2 points for neck circumference ≥ 44 cm, 1.5 points for age ≥ 50 years, and 1 point for fasting glucose ≥ 118 mg/dl). The ENAG-score, including also early post-operative data, showed an AUC = 0.845 and was structured on a 7-point-scale (3 points for %EWL at 6 months ≤ 45%, 1.5 points for neck circumference ≥ 44 cm, 1 point for age ≥ 50 years, and 1.5 points for fasting glucose ≥ 118 mg/dl). A 3-class clustering by ID3 algorithm was proposed for clinical application. For NAG-score, the low-risk (0–1 points), intermediate-risk (1.5–2 points) and high-risk (2.5–4.5 points) classes showed a 10.3%, 20.0% and 54.7% risk of unsuccessful weight loss at 2-years, respectively. For ENAG-score, the low-risk (0–2.5 points), intermediate-risk (3–4.5 points) and high-risk (5–7 points) classes showed a 5.5%, 32.9% and 94.7% risk of unsuccessful weight loss at 2-years, respectively.

Conclusion Our study proposed two scoring systems for pre-surgical and early post-surgical prediction of 2-year BS weight-loss. Their use might provide a simple tool for the evaluation of BS unsuccess risk, which may be useful to guide the preoperative assessment, to appropriately balance patients' expectations, and to manage more effectively the postoperative care.

OP3-6
EVALUATION OF THE EFFECTIVENESS OF INTERDRY® IN THE MANAGEMENT OF INTERTRIGO IN SKIN FOLDS IN OBESE PATIENTS

C. Suman[1], S. Mazza[1], L. Zonca[1], A. Brunani[2], F. Pera[1]

[1]*Istituto Auxologico Italiano, Wound Care Team, Ospedale San Giuseppe Piancavallo (VB),* [2]*Istituto Auxologico Italiano, Ospedale San Giuseppe Piancavallo (VB)*

Introduction Intertriginous dermatitis describes inflammation resulting from moisture trapped in skin folds subjected to skin-to-skin friction. An increased frequency is reported in patients with obesity, especially with increasing body mass index and in women, due to the presence of risk factors such as diabetes and, with complications such as fungal or bacterial infections.

Aim To evaluate the efficacy of the application, between the skin folds with intertrigo, of a polyester fabric coated, by a thin layer of polyurethane, which releases silver ions with antibacterial and antifungal action through a patented complex (MWF, InterDry®—Coloplast).

Methods Patients admitted to the San Giuseppe Hospital for a clinical assessment of obesity, were enrolled when presented a condition of intertrigo at the entrance. In baseline and after the application of MWF for 5–7 days, data were collected on the lesion' characteristics: localization (neck, axilla, under breast, back, abdomen, between finger, groin, upper leg, lower extremities, between toes), extension, erythema (score 0–4), Itching/burning (score 0–1), maceration (score 0–1), satellite lesions (score 0–1), denudement (score 0–1), odor (score 0–3), pain with NRS.

Results 26 lesions were evaluated, 90% in women with mean age 57 ± 4.5 years, BMI 46.7 ± 3.3 kg/m², 27.7% diabetic. Common areas with intertrigo were under breast (46%) and under abdomen (30%). Erythema was present in 100% of cases at baseline and in 19% after use of MWF. Maceration in 92% at baseline and in 30% after 5–7 days. Itching or burning in 100% at baseline and in 11.5% after treatment. Denudement in 88% at baseline and in 7.7% after 5–7 days, satellite lesions in 42% at baseline, 23% at the end. The odor mean value was 2.15, after use of MWF decreased to 0.34. Mean pain was 4.57, decreased to 0.92.

Conclusion These results indicate that MWF can relieve symptoms of intertrigo in various body locations within a 5–7 day period in patients with obesity.

OP4-1
ADHERENCE TO THE MEDITERRANEAN DIET IN METABOLICALLY HEALTHY AND UNHEALTHY OBESE WOMEN

A. Leone[1], R. De Amicis[1], A. Foppiani[1], A. Battezzati[1], S. Bertoli[2]

[1]*International Center for the Assessment of Nutritional Status (ICANS), Department of Food, Environmental and Nutritional Sciences (DeFENS), University of Milan Milan,* [2]*International Center for the Assessment of Nutritional Status (ICANS), Department of Food, Environmental and Nutritional Sciences (DeFENS), University of Milan; Istituto Auxologico Italiano, IRCCS, Lab of Nutrition and Obesity Research, Milan Milan*

Obesity is generally associated with many metabolic abnormalities. However, some people with obesity do not develop any metabolic dysfunction and are considered "metabolically healthy". Adherence to high-quality dietary patterns could be crucial in reducing obesity-

related morbidity. Therefore, we aimed to assess the adherence to the Mediterranean diet (MD) in metabolically healthy obese (MHO) and metabolically unhealthy obese (MUO) women. We performed a cross-sectional study on 2593 obese women (age 18–87) recruited at the International Center for the Assessment of Nutritional Status (ICANS), University of Milan. Anthropometric measurements were taken and BMI and A Body Shape Index (ABSI) were calculated. Blood parameters and systolic and diastolic blood pressure were measured. Medical history and treatments were investigated. MHO and MUO phenotypes were categorized following the harmonized criteria proposed by Lavie et al. Eating behavior was assessed using the Binge Eating Scale. Finally, the 14-item FFQ used in the PRE-DIMED study was used to assess the adherence to the MD (score ≥ 9 points). A total of 538 (20.8%) women were categorized as MHO. Overall, the multivariate logistic regression model, adjusted for age, BMI, ABSI, marital status, education, physical activity, smoking, family history for diabetes and cardiovascular disease, and eating behavior, did not show any association between the adherence to the MD and the risk of having MUO phenotype (OR = 0.95; CI 95% 0.67–1.36, p = 0.801). However, when we stratified the analysis for age, we observed that women aged ≥ 50 years (n = 1092) with a higher adherence to the MD had a lower likelihood of having MUO phenotype (multivariate OR = 0.57; CI 95% 0.34–0.97, p = 0.037) than women with a lower adherence. No association was found in younger women. In conclusion, the adherence to the Mediterranean diet might be beneficial for obese women aged ≥ 50 years to reduce the risk of obesity-related metabolic dysfunctions.

OP4-2
EFFECTS OF LOW-CARBOHYDRATE VERSUS MEDITERRANEAN DIET ON WEIGHT LOSS, GLUCOSE METABOLISM AND INFLAMMATION IN MORBIDLY OBESE PATIENTS

D. Moriconi[1], D. Tricò[1], L. Antonioli[2], R. Berta[3], M. Nannipieri[2], S. Taddei[2]

[1]Department of Surgical, Medical, Molecular Pathology and Critical Care Medicine, University of Pisa Pisa, [2]Department of Clinical and Experimental Medicine, University of Pisa Pisa, [3]AOUP Pisa

Background and aims Obesity is associated with a systemic low-grade inflammation supported in part by inflammasome NLRP3. Low-calorie diets, Mediterranean (MD) or low-carbohydrate (LC), are nutritional strategies against obesity. The aims of this study were (1) to compare the effectiveness of MD and LC on weight loss and glucose homeostasis in morbidly obesity; (2) to evaluate the impact of MD and LC on chronic inflammation mediated by inflammasome NLRP3.

Methods 15 and 17 patients with morbid obesity and normal glucose tolerance, were randomly assigned to MD and LC, respectively, and followed for a period of 4-weeks. Insulin secretion and β-cell function were estimated by modeling plasma glucose, insulin and C-peptide profiles during 75-g oral glucose tolerance tests performed at baseline and after 4-weeks. Il1β and Caspase-1 were measured by ELISA kit at baseline and after 4-weeks.

Results The average weight loss was greater in LC than MD (5.7 ± 1.8% and 3.6 ± 1.6%, respectively; p = 0.001). Fasting plasma glucose was not affected by the diets, while fasting plasma insulin was similarly reduced in both groups (*p time* 0.02). Insulin sensitivity, measured by ISI-M, similarly improved in both groups (2.3 ± 1.0 vs 2.9 ± 1.0 LC, 2.6 ± 1.8 vs 2.8 ± 1.7 MD, baseline vs after diet, respectively, *p time* 0.05), as well as β-cell glucose sensitivity (49.1 ± 19.5 vs 69.4 ± 30.7 LC, 57.1 ± 21.9 vs 90.7 ± 35.6 MD, pmol min^{-1} m^{-2} mM^{-1}, baseline vs after diet, respectively, *p time* 0.03). Finally, serum caspase-1 did not change after diet, while

Il1β significantly decreased, mostly in the MD group (3.0 ± 1.4 vs 2.7 ± 1.2 LC, 3.6 ± 1.1 vs 2.6 ± 1.1 MD, pg/ml, baseline vs after diet, respectively, *p time* < 0.001, *p interactions* 0.01).

Conclusion MD and LC are successful short-term approach for weight loss in morbidly obesity and improve insulin resistance and β-cell function. LC is more effective on weight loss, while MD have a greater impact on the reduction of inflammation mediated by inflammasome NLRP3.

OP4-3
THE ROLE OF CHRONOTYPE ON ANTHROPOMETRIC AND METABOLIC PROFILE IN SEVERE OBESITY: A GENDER PERSPECTIVE

G. Pugliese[1], L. Barrea[2], D. Laudisio[1], S. Aprano[1], S. Savastano[1], A. Colao[3], G. Muscogiuri[3]

[1]Dipartimento di Medicina Clinica e Chirurgia, Unit of Endocrinology, The European Association for the Study of Obesity (EASO) Collaborating Centres for Obesity Management (COM); Federico II University Medical School of Naples, Via Sergio Pansini, 5 Napoli, [2]Dipartimento di Scienze Umanistiche, Università Telematica Pegaso, Via Porzio, Centro Direzionale, isola F2, 80143 Napoli, Italy Napoli, [3]Cattedra Unesco "Educazione alla salute e allo sviluppo sostenibile", University Federico II, Naples, Italy Napoli

Introduction Chronotype is the attitude of subjects to carry out their activities in accordance with their biological rhythms and the external light–dark cycle. However, little is known about the link between chronotype and metabolic parameters in subjects with severe obesity, especially with regard to a possible gender difference.

Objective The aim of our study was to investigate if there was any gender difference regarding the association of chronotype categories with anthropometric and metabolic abnormalities in subjects with severe obesity.

Methods 75 subjects (age 38.5 ± 12.3; 19 M/56 F; BMI 51.4 ± 16.1 kg/m^2) with severe obesity were enrolled. Anthropometric assessment (weight, height, BMI, waist circumference WC) and metabolic parameters (total, HDL, LDL cholesterol, triglycerides, fasting glucose, insulinemia, HbA1c) were collected. Chronotype was assessed by the MEQ. (1) Based on their scores, subjects were categorized as Morning MC, Neither NC or Evening EC chronotype.

Results In all cohort chronotype was classified as MC in 26.7%, NC in 42.6% and EC in 30.7% of subjects. ECs have a higher BMI than MCs (54.03 ± 14.04 vs 42.3 ± 5.3 P < 0.049) and belong more frequently to class III obesity than MCs and NCs (22, 95.6% vs 11, 55%, χ^2 = 9.9, p = 0.001; 22, 95.6% vs 24, 65% χ^2 = 3.9, p = 0.047). No differences were detected in terms of studied parameters among the 3 groups and comparing males and females. We further analyzed if there was any differences among 3 chronotype categories within male and female groups. Both in males and females, ECs had an increased prevalence of class III obesity compared with MCs (M:6, 100% vs 2, 28.6% χ^2 = 6.28, p = 0.043; F:4, 30.7% vs 1.5.9% χ^2 = 3.28, p = 0.049). Only in males group, ECs had higher WC (147.16 ± 12.25 vs 123.85 ± 8.62, P = 0.004), total cholesterol (210.8 + 33.5 vs 175.4 + 39.4, p = 0.049) and LDL cholesterol (147.5 + 35.6 vs 103.28 + 42.01, p = 0.049) than MCs. No differences were detected in terms of metabolic parameters among women.

Conclusions Our study shows that the impact of chronotype on anthropometric and metabolic parameters in obesity is gender-related. Indeed, EC is associated with a worse anthropometric parameters and lipid profile in males thus suggesting the utility of chronotype assessment in order to set up a tailored treatment, mostly in males. (1) PMID:1027738.

OP4-4

IMPACT OF THE COVID-19 PANDEMIC-RELATED LOCKDOWN ON LIFESTYLE HABITS AND ACADEMIC PERFORMANCE OF STUDENTS OF A MASTERS' DEGREE IN HUMAN NUTRITIONAL SCIENCES

M. Cantisani[1], C. Conte[1]

[1]*San Raffaele Roma Open University Roma*

The COVID-19 pandemic-related confinement measures may dramatically impact lifestyle habits. Between 6 and 15 January 2021 we conducted an online survey among students of a Masters' Degree in Human Nutritional Sciences to assess the impact of the pandemic-related lockdown (LD) on their lifestyle and academic performance. The analysis included 398 participants (64.1% females, median age 31.0 [27.0; 36.3] years). Stress was the most common emotional reaction (60.8%), followed by anxiety (48.7%), tiredness (50.0%), anger (32.9%), insomnia (31.2%), and loneliness (27.1%). Approximately a third (33.2%) reported to have eaten more to cope with negative emotions and/or to feel better. 45% of participants reported to have decreased the level of physical activity (PA), 47% to have maintained the same level and 8% to exercise more *vs.* before the LD. Median BMI significantly increased, from 22.3 (20.2; 24.6) to 22.6 (20.3; 24.6) kg/m², p < 0.001. 112 participants (28.1%) reported to have gained more than 2% of pre-LD weight, more than half (57.3%) remained weight-stable and 14.6% reported a weight loss > 2%. At univariable regression analyses, living in Southern Italy, a reduction in PA, emotional eating and insomnia were associated with increased odds of gaining weight. At multivariable regression, only living in Southern Italy and emotional eating retained significance. The percentage of students who took at least one exam was similar between the sessions before and during the LD (76.9% in September *vs.* 71.6% in December, p = n.s.), but average examination grading was significantly higher in the latter session (27 [24.0; 28.0] *vs.* 27.0 [25.0; 28.5]; p = 0.003). We conclude that the LD was associated with worsening of lifestyle habits (as reflected by clinically meaningful weight gain > 2%), even among future nutrition professionals, who have a greater food literacy than the general population. However, their academic performance was not negatively affected.

OP4-5

AIR POLLUTION AND CARDIOVASCULAR DISEASES IN SUBJECTS WITH OBESITY: PRELIMINARY DATA FROM SPHERE STUDY

L. Vigna[1], V. Bollati[2], A. C. Pesatori[2], L. Riboldi[1]

[1]*Center of Obesity and Work, Unit of Occupational Medicine; Clinica del Lavoro Luigi Devoto; Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico. Milano, [2]EPIGET LAB, Department of Clinical Sciences and Community Health, Università degli Studi di Milano Milano*

Epidemiological findings shows that increased air pollution is related to cardiovascular diseases (CVD). Particulate matter (PM) produces a local inflammatory reaction in pulmonary extracellular vesicles (EVs) and their miRNA cargo might be candidate to mediate effects of PM, and lead to development of cardiovascular effects.

SPHERE ("Susceptibility to Particle Health Effects, miRNAs and Exosomes") study examine molecular mechanisms underlying effects of PM exposure in relation to health outcomes in 2000 patients with overweight-obesity recruited at the "Center of obesity and work". (1) Preliminary results: PM10 exposure 24 and 48 h before the recruitment day was associated with increased systolic BP (β = 1.22 mmHg, P = 0.019; β = 1.24 mmHg, P = 0.019, respectively) and diastolic BP (β = 0.67 mmHg, P = 0.044; β = 0.91 mmHg, P = 0.007, respectively). We identified nine miR-NAs associated with PM10 levels 48 h after exposure. (2) An inverse association between the daily PM10 exposure and the DNA methylation of inflammatory genes was found. (3) Considering different exposure time-windows, the effect on CD14 and TLR4 methylation was observed, respectively, in days 4–5–6, and days 6–7–8 before recruitment. TNF-α methylation was not associated to PM10. Short-term exposure to PM10 was associated with increased release of EVs especially derived from monocyte/macrophage components; with elevated fibrinogen levels; five of nine downregulated EV-miRNAs were mediators between PM10 exposure and fibrinogen levels. (4) PM10 exposure positively associates with proprotein-convertase subtilisin/kexin-type-9 PCSK9 levels especially in patients with low levels of interferon-g. (5) Conclusions: SPHERE study aimed to explore how air pollution exposure acts as trigger for cardiovascular diseases in highly susceptible population as patients with overweight-obesity.

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OP4-6

PROGRESSION OF PREDIABETES TO DIABETES IN A COHORT OF ADULTS LIVING IN PALERMO, ITALY (THE ABCD STUDY 2011–2015)

C. Buscemi[1], A. M. Borzì[2], D. Corleo[2], C. Randazzo[2], A. M. Barile[2], V. Maniaci[2], G. Rosafio[2], V. Settipani[2], N. Rini[2], B. Sgrò[2], E. Finamore[2], S. Buscemi[2]

[1]*Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo". Postgraduate Specialization School in Geriatrics- University of Catania Palermo; Catania, [2]Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone". Palermo*

Background Prediabetes (PD) precedes type 2 diabetes (T2D), it can be easily recognized by fasting plasma glucose concentrations (FPG) or HbA1c or 2 h post glucose load glycemia, thereby enabling prevention strategies. We investigated the progression of PD to T2D in the ABCD study (Alimentazione, Benessere Cardiovascolare e Diabete-ISRCTN15840340) that included a representative cohort of adult people living in Palermo.

Materials and methods The ABCD cohort was enrolled in 2011 and re-evaluated in 2015. The FPG, HbA1c, physical activity level and dietary habits were investigated. In 2011 participants were informed about their health conditions and indications concerning a healthier lifestyle were provided.

Results Complete information was obtained on 744 out of 1233 individuals. In 2011, the prevalence of PD was 28.9% of which 8.7% developed T2D (RR = 6.41; 95% CI 2.7–15.1) and 46.9% reversed to normal glucose tolerance (NGT) at follow-up. In 2015, 105 previously NGT participants resulted with PD. As the progression to T2D as to PD were related to age (P < 0.001) and male sex (P < 0.001). Body weight, BMI, and waist circumference were higher in people

with PD or T2D than in the NGT group (P < 0.001). Waist circumference increased in previously NGT people who developed PD (P < 0.001). A sedentary lifestyle was observed in the PD and NGT subgroups which developed T2D (RR = 1.6; 95% CI 1.1–2.2). Daily energy intake decreased among people with PD who became NGT (P < 0.001) and increased in those who developed T2D (P < 0.05). All subgroups exhibited a change in the habitual intake of macronutrients (more carbohydrates, less lipids, more vegetable proteins, less animal proteins).

Conclusions This study suggests that improving individual motivation is an effective strategy to promote healthier lifestyles. A more physically active lifestyle and Mediterranean dietary habits are associated with a reduction of central obesity and a favorable progression of glucose tolerance in PD people.

POSTER SESSION

P1-1
LIPIDOMICS: NEW FRONTIER OF THE KETOGENIC DIET

A. Lodi[1], L. Cenci[2]

[1]*Nutrition Department, KERIX LAB Vicenza,* [2]*Department of Biomedical Sciences, University of Padova Padova*

Lipidomics and ketogenic diet Lipidomics is the discipline that studies lipid changes that occur during cellular metabolism. This new approach can be applied to the ketogenic diet (KD) where fats are the predominant macronutrient. After a few days of reduced carbohydrate consumption, glucose reserves become insufficient both for normal fat oxidation via the supply of oxaloacetate in the Krebs cycle and for the supply of glucose to the central nervous system. The alternative energy source is derived from the overproduction of acetyl coenzyme A. This condition, called ketogenesis, leads to the production of higher-than-normal levels of so-called ketone bodies.
Lipidomics and obesity The acceleration of the production of monounsaturated fats (MF) is so characteristic of obesity that the palmitic-palmitoleic track is indicated as a biomarker even the risk of weight gain. Palmitoleic is known as lipoquine, as it regulates the fat transfer from adipose tissue to muscle. In obesity it increases because it is a defence mechanism of the body to transport fats to the muscle, thus avoiding their excessive accumulation in the liver. The saturated/MF ratio indicates the level of stiffness of the membrane. The increase in membrane stiffness leads to a decrease in the number of insulin receptors predisposing to the onset of diabetes. Each cellular compartment has its own lipid content which can be monitored by lipidomics but the erythrocyte membrane has been shown to have the suitable characteristics to become an important site for lipidomic analysis.
Conclusions KD could be customized based on the results of the membrane lipidomic analysis. The lipidomic profile of an obese subject is characterized by an imbalance of PUFA in favour of omega-6 and by an excess of MF. This imbalance must be taken into consideration in the formulation of the KD protocol: only in this way, the epigenetic structure will be favourable to the establishment of a new balance unfavorable to fat accumulation.

P1-2
EFFECT OF THE KETOGENIC DIET ON THE HUMAN GUT HEALTH: A PERSISTENT BIAS

L. Cenci[1], A. Lodi[2], A. Scarilli[3], N. Lukashina[3]

[1]*Department of Biomedical Sciences, University of Padova Padova,* [2]*Nutrition Department, KERIX LAB Vicenza,* [3]*Research and Development Department, GM SpA Vicenza*

The consensus is that ketogenic diets (KDs) are harmful to human health because they lack accessible carbohydrates for the microbiota. In the absence of these, proteins and fats will damage our gut health. However, research shows that KD diets play a role in various forms of cancer, cardiovascular disease, immunological dysregulation and diabetes, through a variety of mechanisms. The microbiome is made up of trillions of microscopic organisms in the human gastrointestinal tract that lives in a complex ecosystem. The genetic makeup of a microbiome can be influenced by lifestyle factors (sleep, exercise, antibiotic use, diet). These bacteria can alter our food response by affecting the postprandial glycemic response. Since controlling blood glucose levels appears to reduce the risk of metabolic diseases, this could be an innovative way to reduce the risk of the disease. It is important to determine whether changes in the ketogenic diet will positively or negatively affect microbiome diversity. Currently, scientists have no data on the long-term effects of the ketogenic diet on the gut microbiome. In a 6-month study in children with refractory epilepsy treated with a classic 4:1 ratio ketogenic diet for 6 months was found a significant decrease in Firmicutes (Fi) and an increase in Bacteroides (Ba), although the overall diversity decreased [Zhang Y, 2018]. Studies have shown that a low ratio of Fi to Ba is an indicator of a healthy microbiome [Ley RE, 2006]. Regarding obesity, Gutierrez et al. reported, after 2 months of VLCKD followed by 2 months of a low-calorie diet (LCD), an increase in gut microbiota diversity. Proteobacteria gave way to Firmicutes, and the genus Oscillospira, which showed protective associations with visceral fat mass and Butyricimonas, a butyrate producer, had increased values after the weight-loss diet (Gutierrez-Repiso C, et al., 2019). Therefore, it appears that KDs can lead to positive changes in the microbiome, but more studies are needed.

P1-3
VERY LOW CALORIE KETOGENIC DIET WITH PROTEIN REPLACEMENT: A POTENTIAL TREATMENT FOR BINGE EATING AND FOOD ADDICTION SYMPTOMS IN WOMEN. A PILOT STUDY

M. Marchetti[1], E. Rostanzo[2]

[1]*Università Roma Tor Vergata Roma,* [2]*Università Siena Siena*

Objective Many patients who struggle with the desire of losing weight are unable to cut down certain of ultraprocessed, refined and with high glycemic index types of food. This condition is linked to responses similar to addiction and lead to overeating. A very low- calorie ketogenic diet (VLCKD) with adequate protein intake could be considered a valuable dietary approach. The use of protein supplementation ensure the adequate protein intake and prevent muscle mass loss. The aim of the study was to evaluate the feasibility of a VLCKD in women with binge eating and/or food addiction symptoms.
Materials and methods Subjects diagnosed with binge eating and/or food addiction symptoms (measured with the Binge Eating Scale and the Yale Food Addiction Scale 2.0) were asked to follow a VLCKD with protein replacement for 5–7 weeks (T1) and a low calorie diet for 10–21 weeks (T2). After T1 and T2, self-reported FA and Binge Eating symptoms and body composition were tested.
Results 5 women were included in the study. Mean age was 36.4 (SD = 11.06) years old and mean BMI was 31.16 (SD = 2.03). After T1 weight loss ranged from 4.8 to 11.6% of the initial body weight and after T2 patients' weight loss ranged from 7.3 to 12.8% of the initial body weight. No case of FA and/or binge eating symptoms was recorded at T2. Protein supplementation was useful to ensure the correct protein intake and preserve muscle mass.
Conclusions Recent findings highlighted the potential therapeutic role of ketogenic diets for the treatment of addiction to high calorie, ultraprocessed and high glycemic food. In addition, the satiating role of protein replacement is also useful to prevent muscle mass loss. The suppression of hunger induced by ketosis provides a theoretical basis to prescribe ketogenic diets for the treatment of overeating disorders. Our pilot study demonstrates the feasibility of a ketogenic diet in women with addictive-like eating disorders seeking weight loss.
Keywords VLCKD; Ketogenic diet; Eating disorders; Food addiction; Binge eating.

P1-4

CHANGES IN BODY COMPOSITION OF A SIX MONTHS KETOGENIC DIET IN OBESE SUBJECTS

S. Lucà[1], F. Giofrè[1], I. Zaffina[1], V. Forte[1], M. Ricchio[1], M. C. Pelle[1], F. Arturi[1]

[1]Department of Medical and Surgical Sciences, University "Magna Graecia" of Catanzaro, Catanzaro, Italy Catanzaro

Introduction Excess of fat mass (FM), especially visceral fat, is associated with a variety of clinical conditions and induce an increase in cardiovascular mortality. In the treatment of obesity, the common diets cause loss of fat-free mass (FFM; i.e., muscular tissue) that is lost together with the fat-mass (FM). This produces so-called sarcopenic obesity, that is a cause of cardiometabolic disorders. The very low-calorie ketogenic diet (VLCKD) is a nutritional protocol characterized by a reduction of daily carbohydrate intake, usually lower than 30 g/day ($\simeq$ 13% of the total energy intake), a relative increase in fat ($\sim$ 44%) and protein ($\sim$ 43%) percentages and a total daily energy intake < 800 kcal.

Aim To evaluate changes in body composition associated with a 6 months VLCKD in obese subjects.

Methods Eleven obese subjects (10 F/1 M; age: 42.1 ± 8.4 years) have been enrolled. The inclusion criteria were a body mass index (BMI) > 30 kg/m^2, a desire to lose weight, and a history of failed dietary efforts. At baseline and after 6 months of VLCKD an antrhopometric (body weight, body mass index) and bioimpedenzometric (fat mass, free fat mass, muscle mass, basal metabolic rate) evaluation has been performed.

Results After 6 months of the VLCKD, we observed a significant reduction of body weight (79 ± 10.7 vs 97.7 ± 16.3 kg, $- 18 \pm 8.3$ kg; $P < 0.0001$), of BMI (28.6 ± 2.5 vs 35.6 ± 3.9 kg/m^2, $- 7.1 \pm 2.7$ kg/m^2; $P < 0.0001$) and fat mass (FM) (29 ± 6.8 vs $39.5 \pm 5.7\%$, $- 9.7 \pm 5.5\%$; $P < 0.0001$). Conversely, we observed a significant increase of free fat mass (FFM) (69.8 ± 7.6 vs $60.4 \pm 5.7\%$, $+ 9.3 \pm 6.1\%$; $P < 0.001$) and muscle mass (MM) (46.1 ± 5.9 vs SUPPLEMENT ARTICLE 319 of $34,740.7 \pm 5.4\% + 5.4 \pm 3.7\%$; $P < 0.001$). A not significant reduction of basal metabolic rate (BMR) has been also observed.

Conclusions Although preliminary, our data, show that VLCKD is able to induce weight loss and changes in body composition in obese subjects, preserving MM and FFM and decreasing FM.

P1-5

A VERY LOW-CALORIE KETOGENIC DIET IMPROVES QUALITY OF LIFE AND PAIN IN A PATIENT WITH RHEUMATOID ARTHRITIS AND OBESITY: A CASE REPORT

R. Rossetti[1], M. E. Spoltore[1], A. Caputi[1], A. Balena[1], R. Risi[1], D. Masi[1], E. Gangitano[1], R. Tozzi[2], M. Watanabe[1], S. Mariani[3], C. Lubrano[1], L. Gnessi[1]

[1]Department of Experimental Medicine, Section of Medical Pathophysiology, Food Science and Endocrinology, Sapienza University of Rome Roma, [2]Department of Molecular Medicine, Sapienza University of Rome Roma, [3]Department of Experimental Medicine, Section of Medical Pathophysiology, Food Science and Endocrinology, Sapienza University of Rome Roma

Aim To report how a very low-calorie ketogenic diet (VLCKD) improved the clinical picture in a patient with rheumatoid arthritis (RA) and obesity.

Background RA is an autoimmune, chronic, disabling inflammatory disease. Recent findings suggest that the KD may improve chronic inflammation and mood, possibly also suppressing the autoimmune response. Preclinical studies suggest a role in pain control, with promising reports on migraine in human subjects. These effects seem to occur through pathways ultimately leading to oxidative stress and inflammation reduction.

Case summary In April 2021, we evaluated a 49-year-old woman with RA, obesity, and insulin resistance. The patient was 165 cm tall, with a weight of 83.7 kg (BMI = 30.7). Before starting the new dietary regimen, the patient was subjected to routine blood tests and was administered the Rheumatoid Arthritis Impact of Disease questionnaire (RAID) to investigate quality of life and pain. She then underwent a 4 week-long VLCKD with meal replacements, with a 7 kg weight loss (BMI 28.3). Upon repetition of blood tests and RAID questionnaire, HOMA-IR dropped from 3.82 to 2.9, and C-reactive protein (CRP) from 1900 to 1600 µg/L. The RAID score decreased from 6.07 to 1.96 out of 10, reflecting a significant improvement overall, and a striking improvement in the pain (7 to 2), function (7 to 1), fatigue (8 to 2), and emotional well-being (7 to 1) domains. The patient is currently following a KD with meal replacements and protein dishes with a gradual increase in calorie intake and will be reevaluated soon to investigate for maintenance of such improvement.

Conclusion Aside a reduction in CRP and HOMA-IR, a frankly improved quality of life was observed in a patient with RA and obesity upon a VLKD, in line with the reported role of ketosis in improving inflammation and autoimmunity. Such improvement in our patient is very promising, but more studies are needed to suggest this dietary regimen as a therapeutic option in RA.

P1-6

THE KETOGENIC DIET MODIFIES THE BODY COMPOSITION IN SUBJECTS WITH SEVERE OBESITY AND HYPERINSULINEMIA

M. R. Ritacco[1], E. Lapini[1], V. R. Pullara[1], A. Monti[1], F. Selmi[1], V. Zaccheroni[1]

[1]Ospedali Privati Forli. Villa Igea Forli'

Observational descriptive study of the effects of a ketogenic diet (VLCKD) on body composition and on glycometabolic parameters, in subjects with obesity during a rehabilitative hospitalization regime.

Materials and methods A comparison between 9 subjects, mean age 55.8 ± 9.9, BMI 47 ± 11.5 kg/m^2 and 9 subjects with low calorie diet, mean age 50.1 ± 15.4, BMI 41 ± 5.96 kg/m^2, in a hospitalization period of 24 ± 4.9 days. None of the subjects have insulin therapy.

Results Between the two groups there was a reduction in body weight of 5.77% vs 4.59% (p < 0.01), in the abdominal circumference centimeters of $- 7.63 \pm 2.1$ vs $- 6.83 \pm 2.8$ respectively (p < 0.01) and glycometabolic parameters (p < 0.01). The bioimpedance analysis showed a likely improvement in body composition: ICW% + 1.72, BCM% + 1.86, BP° + 2.82 vs ICW% − 0.42, BCM% − 0.43, BP° + 1.74.

Conclusions VLCKD determines a significant improvement in body weight and glycometabolic indices; the body composition varies in percentage to express a preservation of lean mass, even if in the absence of statistical significance.

P1-7

THE VITAMIN D SERUM CONCENTRATIONS AND OBESITY DILEMMA: EFFECT OF WEIGHT LOSS INDUCED BY A VERY LOW-CALORIE KETOGENIC DIET

C. Buscemi[1], A. M. Borzì[2], S. Milazzo[3], D. Corleo[3], C. Randazzo[3], A. M. Barile[2], G. Rosafio[2], V. Settipani[2], S. Gurrera[3], E. Finamore[3], G. De Pergola[4], S. Buscemi[2]

[1]Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, 90133 Palermo, Italy. Postgraduate Geriatrics School, University of Catania Palermo; Catania, [2]Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, 90133 Palermo, Italy. Unit of Clinical Nutrition, Policlinico University Hospital, 90127 Palermo, Italy. Palermo, [3]Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, 90133 Palermo, Italy. Palermo, [4]Department of Biomedical Science and Human Oncology, School of Medicine, Policlinico, University of Bari, 70124 Bari, Italy. Bari

Background Vitamin D plays a central role in calcium and phosphorus metabolism, also influencing bone tissue. Several studies reported that vitamin D blood levels are significantly lower in people with obesity, probably due to its uptake by the adipose tissue. Clinical studies that investigated the changes of serum levels of vitamin D after weight loss reported controversial data. The very low-calorie ketogenic diet (VLCKD) is acknowledged as a reliable treatment to achieve a rapid weight loss. Therefore, we investigated the effect of weight loss, consequent to a VLCKD, on vitamin D blood concentrations.

Methods A cohort of 31 people aged between 18 and 65 years with obesity (BMI > 30 kg/m^2) underwent a very low-calorie (600–800 kcal/die) ketogenic diet for 10–12 weeks. The serum concentrations of vitamin D, parathormone, calcium and phosphorous were measured before and after weight loss; they were compared to a control group of 20 non-obese, non-diabetic, age- and gender-matched persons from ABCD2 study. Body fat mass was measured by bioimpedance analyses (BIA, Akern, Florence, Italy).

Results The obese group had a higher habitual intake of vitamin D than the control group ($p < 0.05$). However, the vitamin D blood levels of the obese group were significantly lower than those of the control group ($p < 0.005$) but increased following weight loss ($p < 0.001$). At baseline, vitamin D blood concentrations of the persons with obesity were inversely correlated with both fat mass-kg ($r = -0.40; p < 0.05$) and BMI ($r = -0.47; p < 0.01$). Following VLCKD, the change in vitamin D serum concentrations was correlated only with the change in fat mass-kg ($r = -0.43; p < 0.01$).

Conclusion This study confirmed that patients with obesity have lower vitamin D levels that normalize after significant weight loss, supporting the hypothesis that vitamin D is stored in the adipose tissue and released following weight loss.

P1-8

MEDITERRANEAN VERSUS KETOGENIC DIET EFFECTS ON ANTHROPOMETRIC AND METABOLIC STATUS IN PATIENTS WITH OBESITY AND TYPE 2 DIABETES

A. Deledda[1], G. Cambarau[1], M. Pilia[1], C. Delogu[1], E. Loi[1], A. Lai[2], F. Velluzzi[1]

[1]Department of Medical Sciences and Public Health, University of Cagliari Cagliari, [2]PO Binaghi Diabetologia ATS Sardegna Cagliari

Introduction Type 2 diabetes (T2D) is a chronic disease affecting mainly overweight people, with metabolic alterations and increased cardiovascular risk and mortality. Current guidelines recommend nutritional intervention as an essential tool to manage this condition, but the optimal dietary strategy is still debated. In this study, we compared the efficacy of a conventional Mediterranean Diet (MD) with a low-carb Ketogenic Diet (KD) on anthropometric and metabolic variables in T2D obese patients.

Materials and methods A sample of 12 obese adult patients (6 M, 6 F) with newly diagnosed T2D was randomly assigned to MD or KD. MD was tailored considering anthropometric indices and eating habits, based on classical guidelines. KD was adopted via meal replacements and supplements, according to SIE guidelines. The diet was extended for 2 months, followed by a progressive reintroduction of carbohydrates. Anthropometric indices (Body weight, BMI, Waist Circumference, Fat Mass) and biochemical values, including fasting glycaemia (FPG), HbA1C, C-Peptide, and lipid profile, were evaluated at baseline and after 3 months.

Results Both groups significantly improved their anthropometric and metabolic status. Patients submitted to KD, achieved greater results in FPG (− 24.8 vs. + 6.3 mg/dl; p = 0.04), weight loss (− 15.2 vs. − 2.8 kg; p = 0.002), BMI (− 5.3 vs. − 1.4 kg/m^2; p = 0.001), Waist Circumference (− 12.9 vs. − 4.4 cm; p = 0.003), Fat Mass (− 7 vs. − 2.7%; p = 0.01) than those submitted to MD. However, improvements in HbA1c and lipid status did not significantly differ with the two diets.

Conclusions Our results highlight that, despite the greater improvement in many outcomes and particularly in anthropometric indices with KD, both diets have similar effects on metabolic status. The study, owing to the COVID-19 pandemic, is still ongoing and follow-up assessments (at 6 and 12 months) will establish whether the results obtained at 3 months, will be maintained over time.

P1-9

THE EFFECTS OF A DIETARY TREATMENT ASSOCIATED WITH A NUTRACEUTICAL SUPPLEMENTATION IN A POPULATION OF OBESE WOMEN WITH METABOLIC SYNDROME

N. Cacciapuoti[1], M. Chiurazzi[1], N. Serao[1], M. S. Lonardo[1], F. De Giovanni Di Santaseverina[1], T. Di Lauro[1], G. Esposito[1], B. Guida[1]

[1]Department of Clinical Medicine and Surgery, Physiology Nutrition Unit, "Federico II", University of Naples, 80131 Naples, Italy

Metabolic syndrome (MetS) is a widespread and multifactorial disease, characterized by abdominal obesity, insulin resistance, hypertension and hyperlipidemia. Antihypertensives, statins and metformin represent the most effective treatments for many metabolic alterations related to this disease; to date, some natural compounds such as curcumin, seem to exert some beneficial effects for the treatment of MetS.

The aim of this study was to evaluate the effects of a nutraceutical supplementation of curcumin and piperine on nutritional status and biohumoral parameters such as lipid profile and glucose profile, in a group of women affected by metabolic syndrome.

Forty women with Body Mass Index ≥ 30 kg/m^2 attending at Outpatients Clinic of the Departmental program "Diet therapy in transplantation and chronic renal failure", School of Medicine, "Federico II" University of Naples, were recruited. Subjects were randomized into 2 groups and treated for 3 months. The first group was treated with a low-calorie diet (D Group); the second one was

treated with a low-calorie diet associated with a nutraceutical supplementation of curcumin and piperine (H group). Anthropometric measurements as well as bioimpedance analysis and biohumoral parameters were evaluated at baseline and after 3 months.

After 3 months of treatment, the patients of both groups showed a significant improvement of lipid and glucose profile status compared to baseline. Furthermore, H group showed a significant greater reduction of Tot Chol., glycemia and insulin ($15.8 \pm 4.3\%$, $17.6 \pm 2.8\%$ and $31.8 \pm 1.7\%$ respectively) than D group ($5.6 \pm 7.0\%$, $13.9 \pm 4.4\%$ and $17.9 \pm 6.5\%$ respectively).

Therefore, this study demonstrates that a curcumin and piperine supplementation associated with a low-calorie diet is able to enhance the effects induced by the only diet on lipid and glucose profile, representing a valid treatment for patients affected by MetS.

P1-10

INNOVATIVE SYNERGIC PHYTOTHERAPEUTIC COMPLEX NUTRITIONAL SUPPLEMENTATION, IN ASSOCIATION WITH A HYPOCALORIC DIET, IMPROVES WEIGHT LOSS, LIPID METABOLISM AND CLINICAL PARAMETERS IN OBESE AND METABOLIC SYNDROME PATIENTS,

M. Ben Yahia[1], E. Uras[1], G. Cambarau[1], S. Pischedda[1], M. Melis[1], F. Velluzzi[1], R. Serpe[1]

[1]*Department of Medical Science and Public Health, University of Cagliari, Italy Cagliari*

Obesity is a pathologic condition in which the body fat is implicate in several negative effects on health, and often associated to Metabolic Syndrome (MS), a combination of hypetension, glucose and lipid blood profile alterations, or other metabolic disturbances such as liver function disorders and increased inflammatory status. Weight loss, lifestyle modification and correct nutritional style appear the best therapeutic option in improving metabolic outcomes, mostly when pharmacological treatment is not indicated. Nutraceuticals such as G. Cambogia, Opuntia, C. Forskolii, Horsetail, Birch, Milk thistle, red yeast rice, Dandelion and Lycopene show potentially effective mechanisms of action in fat mass reduction, improving circulating lipid levels and metabolic alterations. Our preliminary study evaluates the efficacy of synergic complex nutraceutical treatment associated to hypocaloric diet on lipid profile, inflammatory status, glucose metabolism markers and anthropometric parameters in obese patients with or without MS. Twentyfive obese patients with impaired blood lipid profile, and/or altered glucose metabolism were enrolled. Patients received 2 tablets/day of synergic-complex nutritional supplement containing the above cited pyhto-terapics extracts in the same oral tablet (Anadepis©, Cortex Italia, Milan, Italy) in association with a personalized hypocaloric diet. Treatment duration was 3 months. Lipid profile, glycemia and insulinemia, HOMA index, PCR, AST, ALT and γ-GT, both anthropometric and body composition indices were assessed. Patients showed a significant weight loss (BMI: − 5.30%, $p < 0001$), a reduction of hip, waist circumference and HW ratio ($p < 0.05$) and reduction of total Cholesterol (208.9 ± 36.8 vs 182.3 ± 28.7 mg/dl, $p < 0001$). A trend in LDL reduction (127.8 ± 31.3 vs 106.0 ± 21.1 mg/dl), as well as a reduction in body fat mass, HOMA index, CRP levels (− 11.05%), AST (− 8.34%), ALT and γ-GT (− 44.2%) was found. No significant changes of HDL and glucose blood profile were observed. These preliminary results show the usefulness of this synergic nutritional supplement, in a correct dietary context, assuming a "statin like" potential, and could become a therapeutic option in multitargeted MS and Obesity management.

P2-1

BLOOD GLUCOSE AND EPICARDIAL ADIPOSE TISSUE AT THE HOSPITAL ADMISSION AS POSSIBLE PREDICTORS FOR COVID-19 SEVERITY

G. Guarisco[1], M. Fasolo[1], D. Capoccia[1], G. Morsello[1], A. Carraro[2], P. Zuccalà[3], R. Marocco[3], C. Del Borgo[3], G. Pelle[4], A. Iannarelli[4], E. Orlando[5], A. Spagnoli[2], I. Carbone[5], M. Lichtner[6], G. Iacobellis[7], F. Leonetti[1]

[1]*Dipartimento di Scienze e Biotecnologie medico-chirurgiche, Università Sapienza, Polo Pontino Latina, [2]Dipartimento di Salute Pubblica e Malattie Infettive, Università Sapienza Roma, [3]Unità di Malattie Infettive, Ospedale Santa Maria Goretti, Università Sapienza Latina, [4]Dipartimento di Radiologia Diagnostica e Interventistica, Ospedale Santa Maria Goretti Latina, [5]Dipartimento di Scienze Radiologiche, Oncologiche e Patologiche, Università Sapienza, Polo Pontino Latina, [6]Dipartimento di Salute Pubblica e Malattie Infettive, Università Sapienza / Unità di Malattie Infettive, Ospedale Santa Maria Goretti, Università Sapienza Roma/Latina, [7]Division of Endocrinology, Diabetes and Metabolism, Department of Medicine, University of Miami Florida, USA*

Aim To study the possible association of CT-derived quantitative Epicardial Adipose Tissue (EAT) and glycemia at the admission, with severe outcomes in patients with COVID-19.

Methods 229 patients consecutively hospitalized for COVID-19 from March 1st to June 30th 2020 were studied. Non contrast chest CT scans, to confirm diagnosis of pneumonia, were performed. EAT volume (cm^3) and attenuation (Hounsfield units) were measured using a CT post-processing software. The primary outcome was acute respiratory distress syndrome (ARDS) or in-hospital death.

Results The primary outcome occurred in 56.8% patients. Fasting blood glucose was significantly higher in the group ARDS/death than in the group with better prognosis [114 (98–144) vs 101 (91–118) mg/dl, $p = 0.001$]. EAT volume was higher in patients with vs without the primary outcome [103 (69.25; 129.75) vs 78.95 (50.7; 100.25) cm^3, $p < 0.001$] and it was positively correlated with glycemia, PCR, fibrinogen, P/F ratio.

In the multivariable logistic regression analysis, age and EAT volume were independently associated with ARDS/death. Glycemia and EAT attenuation were risk factor for ARDS/death with a trend of statistical significance.

Conclusions Our findings suggest that even mild hyperglycemia should be adequately treated regardless of diabetes diagnosis and that both blood glucose and EAT, measurable and modifiable targets, could allow the early identification of subjects at greater risk of developing severe complications.

P2-2

OBESITY AS A RISK FACTOR FOR HOSPITALIZATION IN CORONAVIRUS DISEASE-19 (COVID-19) PATIENTS: ANALYSIS OF THE TUSCANY REGIONAL DATABASE

B. Bellini[1], B. Cresci[2], C. Cosentino[2], F. Profili[1], S. Bartolacci[1], D. Scoccimarro[3], F. Voller[1], D. Balzi[4], P. Francesconi[1], E. Mannucci[3]

[1]*ARS Agenzia Regionale Sanità Toscana Italy, [2]Diabetology, Careggi Hospital Florence, Italy, [3]University of Florence Florence, Italy, [4]Azienda Sanitaria Locale Centro Toscana Italy*

Aims Aim of the present study is to determine the role of obesity as a risk factor for COronaVirus Disease-19 (COVID-19) hospitalization.

Methods This observational study was performed using Istituto Superiore di Sanità (ISS) Tuscany COVID-19 database by the Agenzia Regionale Sanità (ARS), including all COVID-19 cases

registered until April 30th, 2020, with reported information on chronic diseases. The principal outcome was hospitalization. An age and gender-adjusted logistic regression model was used to assess the association of clinical and demographic characteristics with hospitalization. Further multivariate models were applied.

Results Of 4481 included subjects (36.9% aged over 70 years), 1907 (42.6%) were admitted to hospital. Obesity was associated with hospitalization after adjusting for age and gender. The association of obesity with hospitalization retained statistical significance in a fully adjusted model, including possible confounders (OR 2.99 [IC 95% 2.04–4.37]). The effect of obesity was more evident in younger (< 70 years) than in older (≥ 70 years) subjects.

Conclusions The present data confirm that obesity is associated with an increased risk of hospitalization in patients with COVID-19. Interestingly, the association of obesity with hospitalization was greater in younger (< 70 years) patients.

P2-3

A RISE IN ADIPONECTIN TO LEPTIN RATIO IN RESPONSE TO SYSTEMIC INFLAMMATION MIGHT REDUCE MORTALITY IN COVID-19

C. Conte[1], L. Di Filippo[2], R. De Lorenzo[2], C. Sciorati[3], A. Capobianco[3], N. Lore[3], A. Giustina[2], A. Manfredi[2], P. Rovere-Querini[2]

[1]IRCCS MultiMedica Milano, [2]Vita-Salute San Raffaele University Milano, [3]IRCCS San Raffaele Hospital Milano

Adipokine dysregulation has been called into question to explain the association between obesity and severe COVID-19, but few data are available to support this hypothesis. We measured adiponectin (AN, an anti-inflammatory adipokine) and leptin (LP, a pro-inflammatory adipokine) in 60 adult patients with COVID-19 pneumonia (68.3% males, median age 59.3 [51.2; 66.6] years, median BMI 27.0 [25.0; 30.5] kg/m^2; overweight and obesity were present in 43.3% and 31.7% of patients, respectively, and 20% had diabetes). COVID-19 severity was classified as mild (patients not hospitalized), moderate (patients hospitalized but not requiring admission to the intensive care unit [ICU]) and severe (admission to ICU or death). Median AN and LP levels were 14.8 [3.2; 29.5] µg/mL and 5.7 [2.8; 10.3] ng/ml, respectively. LP (Spearman's rho 0.48, p < 0.001), but not AN significantly correlated with BMI. AN and LP levels were similar across severity groups, although patients with moderate severity had the highest AN/LP ratio (p = 0.019), due to higher AN and lower LP. Neither adipokine alone correlated with C reactive protein (CRP), whereas the AN/LP ratio did (Spearman's rho 0.293, p = 0.023). None of the patients with mild disease died. Among hospitalized patients, the rate of death decreased with increasing AN/LP tertile (31.2% vs. 23.5% vs. 12.5% from the lowest to the highest tertile), as did the proportion of patients with obesity (40% vs. 35% vs. 20%), diabetes (40% vs. 15% vs. 5%) or hypertension (50% vs. 35% vs. 20%). At multiple linear regression, CRP was a positive predictor of the AN/LP ratio, while female sex, hypertension and diabetes were negative predictors (R^2 = 0.391, p < 0.001). We conclude that, in COVID-19 patients with better cardiometabolic health, an adequate adipokine response (increased AN/LP due to high AN and low LP) to systemic inflammation (CRP) may confer a survival benefit.

P2-4

EFFECTS OF COVID-19 IN ENDOCRINE PATIENTS: RESULTS OF A SICILIAN EXPERIENCE

E. Morini[1], G. Maresca[1], L. Bonanno[1], M. C. De Cola[1], F. Corallo[1], P. Bramanti[1]

[1]IRCCS Centro Neurolesi Bonino Pulejo Messina

Introduction In March 2020 the World Health Organization declared the "pandemic state" due to COVID-19 imposing strict confinement of the world population. People were forced to spend more time at home, changing some daily routines, including social interactions, the possibility to perform sports, and diet habits. These changes could exert a greater impact on patients suffering from chronic diseases, such as endocrine patients. This study aimed to assess the effects of Covid-19 induced quarantine on daily habits in a group of patients with endocrine disorders, focusing on food consumption, eating, and sleep habits during the confinement.

Materials and Methods Eighty-five endocrine patients were enrolled. This is a retrospective study, based on a structured interview on food-related habits during the Covid19 pandemic, conducted on eighty-five patients with endocrine disorders admitted as outpatients. They were patients known in the surgery, followed by the endocrinologist also during the lockdown thanks to periodic check/consultation calls (once every 15/20 days). The structured interview included 3 sections: a section relating to socio-demographic information; a section relating to general medical conditions (present pathologies and comorbidities); a section on habits adopted during the quarantine, especially dietary behavior, social interactions, sleep routine, physical activity and the adoption of healthy habits (i.e., taking supplements, eating healthier, reducing salt and soft drinks, etc.). Moreover, the Spielberger State Anxiety Inventory (STAI-Y1) was administered to assess anxiety caused by a specific condition (state anxiety).

Result and conclusion Around 80% of the subjects suffered from a chronic disease, indifferently by gender (χ^2 (1) < 0.001; p = 0.99). Nobody resulted to be infected by the COVID-19 virus, and only 6% had a family member or an acquainted infected. We found a significant increase in the number of cigarettes in smokers, an increase of meals consumed during the confinement and a high rate of sleep disorder occurrence, especially insomnia. The changes of daily habits were, probably, due to the alterations of routine, that determined more bore and inactivity during the day.

P2-5

THE IMPACT OF COVID-19 LOCKDOWN ON PATIENTS WITH OBESITY AFTER INTENSIVE COGNITIVE BEHAVIORAL THERAPY

S. Calugi[1], B. Andreoli[1], L. Dametti[1], A. Dalle Grave[1], N. Morandini[1], A. Banderali [1], R. Dalle Grave[1]

[1]Casa di cura Villa Garda Garda (VR)

Introduction COVID-19 pandemic lockdown had a significant negative impact on patients with obesity and their treatment. However, no study compared patients with obesity exposed to lockdown with patients with obesity who had not been exposed to lockdown. The present study aimed to assess the effect of COVID-19 lockdown in patients with obesity treated with intensive residential cognitive behavioral therapy (CBT-OB).

Methods This retrospective case–control study analyzed 129 patients with severe obesity who experienced COVID-19 lockdown in the

6 months after discharge from intensive residential CBT-OB, comparing their outcomes on weight loss, binge-eating episodes, and general health status with those in a sample of patients matched by gender, age, and body mass index given the same treatment before the COVID-19 outbreak as control. Patients were assessed at baseline and by phone interview 6-month follow-up.

Results Both groups had lost more than 9% of their baseline body weight and reported a significant decrease in binge-eating episodes and similar general health status at 6-month follow-up. However, control patients achieved a significantly greater weight loss than those who experienced lockdown (13.0% versus 9.4%, respectively), although half of lockdown patients reported persisting with CBT-OB procedures after their discharge.

Conclusions Patients with obesity treated with CBT-OB and exposed to COVID-19 lockdown, despite achieving lower weight loss than non-exposed patients, had a healthy weight loss at 6-month follow-up. These data suggest that, even during adverse events such as the COVID-19 pandemic, a specific treatment for obesity, seems to be able to help patients to maintain successful weight management.

P2-6
EFFECTS ON BODY WEIGHT OF COVID-19 LOCKDOWN IN A COHORT OF PATIENTS WITH TYPE 2 DIABETES: A RETROSPECTIVE STUDY

D. Scoccimarro[1], C. Cosentino[2], B. Cresci[2], E. Mannucci[1]

[1]University of Florence Florence, Italy, [2]Diabetology, Careggi Hospital Florence, Italy

Introduction Lockdown measures for COVID-19 have a potential impact on the management of metabolic diseases. Home confinement could have impaired eating habits and inhibited physical activity, reducing at the same time access to disease monitoring and specialist visits. As a result, lockdown could have determined, in addition to a deterioration of glucose control, an increase in body weight. Aim of this study was to assess body weight changes during lockdown in subjects with type 2 diabetes.

Methods A retrospective cohort study was performed, enrolling patients (> 18 years) with type 2 diabetes referring to Diabetes Outpatient Clinic of Careggi Hospital, Florence, from June 1st 2020 to July 31st 2020 and who had received a previous clinical visit between December 1st 2019 and February 29th 2020. Body weight before and after the lockdown, as retrieved from clinical records, were recorded and absolute/percentual between-difference determined. Furthermore, we checked if patients had a contact with physician during lockdown, in the form either of visit or tele-visit.

Results Out of 174 patients enrolled, 26 (14.9%) had their body weight increased: no significant differences in their characteristics where found from the rest of the sample, with the exception of metformin treatment, which was less prevalent among those with increasing body weight, even after adjusting for confounders. Before lockdown, body weight and body mass index (BMI) of the sample were 82.6 ± 16.7 kg and 28.9 ± 5.6 kg/m^2, respectively. After lockdown, mean body weight difference was $- 0.8 \pm 3.7$ kg ($- 1.0 \pm 4.6$%). Among these patients, 31 (17.8%) received a televisit and 25 (16.1%) a visit during lockdown.

Discussion In our study, patients with type 2 diabetes achieved to maintain their body weight during COVID-19 pandemic, despite restrictive measures. Televisits could have limited the negative impact of lockdown, suggesting a possible role of telemedicine in the future, independent of home confinement.

P2-7
METABOLIC PARAMETERS MAY AFFECT CELL-MEDIATED IMMUNE RESPONSE TO MRNA COVID-19 VACCINE

A. Caputi[1], A. Balena[1], M. Watanabe[1], R. Risi[1], D. Masi[1], R. Tozzi[2], M. E. Spoltore[1], R. Rossetti[1], E. Gangitano[1], V. Filippi[3], S. Mariani[1], C. Lubrano[1], A. Lenzi[1], C. Mastroianni[3], L. Gnessi[1]

[1]Department of Experimental Medicine, Section of Medical Pathophysiology, Food Science and Endocrinology, Sapienza University of Rome, Rome, Italy Roma, [2]Department of Molecular Medicine, Sapienza University of Rome, Rome, Italy Roma, [3]Department of Public Health and Infectious Diseases, Sapienza University of Rome, 00185 Roma, Italy Roma

Background Obesity is associated with worse immune response to some vaccines, and higher infection odds even with robust seroconversion. We showed that central obesity, dyslipidemia, hypertension and smoking habit predispose to lower antibody (Ab) titers upon COVID-19 vaccine.

Aim To evaluate the correlation between cell-mediated immune response following COVID-19 mRNA vaccine and adiposity/metabolic health parameters in healthcare workers.

Methods This pilot study included 18 obese and 18 normal-weight subjects enrolled among healthcare workers of our center receiving Pfizer BioNtech vaccine. Blood samples were collected before the first vaccine inoculation and 18–28 days after the second. To assess the cell mediated immune response, we evaluated interferon (IFN) γ levels after stimulating whole-blood with spike and remainder-antigens peptides megapools (MP) derived from SARS-CoV-2 sequences (QuantiFERON SARS-CoV-2 RUO, Qiagen). Clinical and demographic data were recorded, anthropometric parameters were measured, and body composition was performed through dual-energy-X-ray absorptiometry (Hologic, Waltham, MA).

Results and conclusion No significant difference was found in response to antigens MPs between those with normal weight and obesity, and no correlation was found between adiposity parameters and the immune response. Serum total cholesterol level was found negatively correlated with spike and remainder antigens MPs stimulated IFNγ (R = − 0.55, p = 0.01 and R = − 0.58, p = 0.01, respectively), confirming the negative influence of dyslipidemia on COVID-19 vaccine response. A trend positive correlation was found between lean mass and spike and remainder antigens MPs stimulated IFNγ (R = 0.46, p = 0.07 and R = 0.41, p = 0.1, respectively), suggesting that greater fitness may be associated with better immune response. Altogether, our data suggest that a better metabolic status is associated with stronger cell-mediated response upon COVID-19 vaccine.

P2-8
CHANGES IN FOOD CHOICES FOLLOWING RESTRICTIVE MEASURES DUE TO COVID-19

R. BRACALE[1], C. M. Vaccaro[2]

[1]Department of Medicine and Sciences for Health, Molise University Campobasso, [2]Fondazione Censis, Rome, Italy Rome

Background and aims Following the COVID-19 proliferation beyond the borders of China at the beginning of 2020, containment measures have been taken by different countries around the globe. Citizens were forced to stay at home. The aim of this study is twofold. First, we will provide an analysis of food consumption in Italy during the emergency from a social stance. Secondly, we will consider the risks in relation to health of these food product choices.

Methods and result This analysis is based on IRi's data on consumption trends (percentage increase in sales in value) during the first

period of the spread of coronavirus, from 23rd of February through the 29th of March, 2020. The sample includes 10,769 stores. There was an increase in the consumption of pasta, flour, eggs, long-life milk and frozen foods, in comparison to a reduction of fresh food goods. The sales of snacks have dropped in relation to the production of homemade bread, pizza and cakes.

Conclusion The increase in the consumption of some types of food is linked with their symbolic value and its tendency to carry on at home some external socialization habits. But be careful: these habits are not always healthy.

P2-9

ASSESSMENT OF LIFESTYLE CHANGES IN PATIENTS WITH METABOLIC DISORDERS BEFORE AND AFTER COVID-19 LOCKDOWN

C. Piras[1], S. Corrias[1], M. Colombo[1], A. Loviselli[1], M. Tuveri[1], M. Ghiani[2], E. Cossu[1], F. Sanna[1], A. Pani[1], M. Fosci[1], L. Chessa[1], M. Galletta[1], F. Velluzzi[1]

[1]*Dipartimento di Scienze Mediche e Sanità Pubblica, Università degli Studi di Cagliari Cagliari,* [2]*U.O. Diabetologia distretto Quartu-Parteolla, ATS Sardegna Quartu Sant'Elena*

Non-alcoholic Fatty Liver Disease and Type 2 Diabetes Mellitus are two sides of insulin resistance, resulting from unhealthy lifestyle. This study evaluated the anthropometric indices, Physical Activity Level (International Physical Activity Questionnaire, IPAQ), Mediterranean Diet adherence (PREDIMED and MDS) and quality of life (SF-12) in adult outpatients with metabolic disorders recruited from the University Hospital of Cagliari. Data collection, formerly performed during the medical examination, was interrupted because of the COVID pandemic. We reassessed by phone 86 out of 106 patients examined in the pre-COVID period, in order to evaluate possible changes during quarantine.

In pre-COVID period, 58% of patients had a Body Mass Index (BMI) ≥ 25 kg/m², and 72.8% had waist circumference values above the IDF cut-off (≥ 80 cm for females ≥ 94 cm for males); these parameters did not significantly change in the lockdown.

Regarding lifestyle, the adherence to the Mediterranean diet resulted moderate at baseline and then remained unchanged.

No significant differences were found in physical activity level, although a significant increase of the sitting time was registered during lockdown evaluation (6.2 h/die vs 7.2 h/die; $p < 0.001$).

The SF-12 score showed a slightly significant improvement of the physical index (PCS) during quarantine (44.7 vs. 46.3; $p = 0.05$) while the mental index (MCS) showed a decreasing trend.

Our study highlights that patients suffering from metabolic pathologies, despite the increase of sitting time, did not show a significant worsening in the anthropometric indices or in the eating habits during the quarantine, probably as a result of the constant monitoring and clinical support of the health and metabolic status related to their pathologies. However, the high prevalence of visceral adiposity, already observed from the beginning of the study, indicates the importance of the anthropometric and lifestyle evaluation in these patients.

P2-10

ASSESSMENT OF LIFESTYLE AND QUALITY OF LIFE IN PATIENTS WITH THYROID DISORDERS BEFORE AND AFTER COVID-19 LOCKDOWN

M. Fosci[1], S. Corrias[1], A. Loviselli[1], M. Galletta[1], G. Baghino[1], F. Boi[1], A. Oppo[1], F. Pigliaru[1], F. Pinna[1], R. Rodia[1], A. Pani[1], C. Piras[1], F. Velluzzi[1]

[1]*Dipartimento di Scienze Mediche e Sanità Pubblica, Università degli Studi di Cagliari Cagliari*

Recently, SARS-CoV-2 pandemic forced Italy to go into lockdown which has led to a deterioration in lifestyle. The aim of this study was to examine if COVID-19 outbreak lockdown impacted on anthropometric indices, Physical Activity Level (IPAQ), Mediterranean Diet adherence (MDS and PREDIMED) and quality of life (SF-12) in a cohort of 116 patients (57.2 ± 13.1 years, 96 F) affected by thyroid disorders and in euthyroid state, recruited from Endocrinology Unit of the University Hospital of Cagliari and evaluated before and after lockdown. Before lockdown, data were directly collected during the endocrinological examination, while after lockdown the same data were collected by a telephone interview.

The anthropometric evaluation revealed an overweight condition in 59% of patients, with no significant differences between the two observations (Mean BMI values: 26.5 ± 4.9 vs. 26.6 ± 4.9 kg/m²), whereas waist circumference values significantly increased over time (93.3 ± 12.6 vs. 94.4 ± 12.5 cm; $p = 0.003$). Regarding lifestyle evaluation we observed, during lockdown, a lower adherence to the Mediterranean Diet (PREDIMED score: 7.3 ± 1.8 vs. 7.0 ± 1.8; $p = 0.003$) and a significant increase of the sitting time (6.4 ± 3.2 h/die vs. 9.0 ± 4.2; $p < 0.001$). Moreover, we observed only a slight, not significant, decrease in physical activity level which revealed a sedentary condition both in pre- and post-lockdown (648 and 562 METs/week respectively). Finally, the SF-12 score did not show relevant changes between the two observations.

Our study highlights that patients with thyroid diseases are themselves sedentary and have a high prevalence of overweight that underlines the need for a systematic anthropometric evaluation. The quarantine period has slightly worsened patients' lifestyle and behavior as reflected in the increase of waist circumference mean values.

P2-11

MALNUTRITION, OBESITY, DIABETES, HYPERTENSION AND SEVERE COVID-19 IN ITALY (MODIECOSE IN ITALY): PRELIMINARY RESULTS FROM THE SICILIAN COHORTS (ISRCTN27707558)

C. Randazzo[1], C. Buscemi[2], I. Giammalva[3], M. E. Greggi[4], A. M. Borzi[3], G. Rosafio[3], F. Di Gesù[5], C. Cottone[4], S. Battaglia[6], N. Scichilone[6], M. Barbagallo[7], L. Giannitrapani[8], M. Soresi[8], R. Romano[9], M. Romano[9], S. Buscemi[3]

[1]*Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone"; UOC Pneumology COVID, ARNAS Civico Palermo,* [2]*Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU; Postgraduate Specialization School in Geriatrics- University of Catania Palermo; Catania,* [3]*Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone"; Palermo,* [4]*COVID Medicine, P.O. Madonna dell'Alto, Petralia Sottana, ASP 6, Palermo Petralia Sottana (PA),* [5]*UOC Pneumology COVID, ARNAS*

Civico "Di Cristina Benfratelli", Palermo Palermo, [6]Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone"; UOSD Pneumology COVID, AOU Policlinico Palermo Palermo, [7]Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone"; COVID Medicine- AOU Policlinico, Palermo Palermo, [8]Unit of Clinical Nutrition, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina Interna e Specialistica di Eccellenza (PROMISE), University of Palermo, AOU Policlinico "P. Giaccone"; COVID Medicine, AOU Policlinico, Palermo Palermo, [9]UOC Geriatrics and COVID Medicine-ARNAS Garibaldi "centro", Catania Catania

Background The possible contribution to severe (requesting hospitalization) COVID-19 of comorbidities as hypertension, type 2 diabetes, obesity and also malnutrition, has not been definitely established. So, further data are necessary in order to improve the management of this disease.

Materials and methods We analyzed data of patients hospitalized for COVID-19 until JAN 2021, at 5 COVID-centers in Sicily participating in the "Malnutrizione, Obesità, Diabete, Ipertensione e COVID-19 severo in Italia (MODIeCOSe in Italia)" study, a longitudinal observational, retrospective, multicentre survey that includes patients admitted to a COVID-19 hospital at different centers distributed throughout Italy. Patients were categorized as recovered (favorable outcome, FO), deceased or transferred to the ICU (adverse outcome, AO). Further details are described elsewhere (www.isrctn.com/ISRCTN27707558).

Results We obtained information on 519 patients (61% men, 39% women; $P < 0.001$), aged 70 ± 14 years with (n = 174) BMI: 28.3 ± 5.6 kg/m^2, waist circumference (WC): 95 ± 15 cm; waist circumference/height (WTH): 56.8 ± 9.3. The length of hospital stay was 18.2 ± 12.7 days, 64% of patients had FO and 36% an AO (19.1% exitus; 16.9% transfer to intensive care). The prevalence of diabetes was 29.2% that of hypertension 63.1%. The length of hospitalization was independently associated with BMI, WTH ratio and diabetes ($P < 0.001$). The subgroup with AO exhibited vs FO a higher prevalence of both diabetes ($P < 0.05$) and hypertension ($P < 0.001$) and also lower values of WC ($P < 0.001$), a higher prevalence of underweight ($P < 0.01$) a higher use of artificial nutrition ($P < 0.001$), lower blood concentrations of hemoglobin ($P < 0.05$) and lymphocytes ($P < 0.001$) that define the condition of malnutrition.

Conclusions These preliminary data highlight the importance of correctly diagnose obesity and malnutrition obtaining the most common anthropometric measures, a practice that is often neglected in hospitalized COVID-19 patients.

P2-12

DIFFERENTIAL CONTRIBUTIONS OF DIABETES MELLITUS AND OBESITY TO RISK FOR SEVERE COVID-19 IN SICILY

G. A. Silverii[1], V. Guarnotta[2], A. Cernigliaro[3], S. Radellini[2], D. Scoccimarro[1], S. Scondotto[3], C. GIordano[2], E. Mannucci[1]

[1]Experimental and Clinical Biomedical Sciences "Mario Serio" Department, University of Florence Firenze, [2]Health Promotion, Department of Health Promotion, Mother and Child Care, Internal Medicine and Medical Specialties "G. D'Alessandro", PROMISE, University of Palermo Palermo, [3]Health Activities and Epidemiologic Observatory Division, Health Department-Sicily Region Palermo
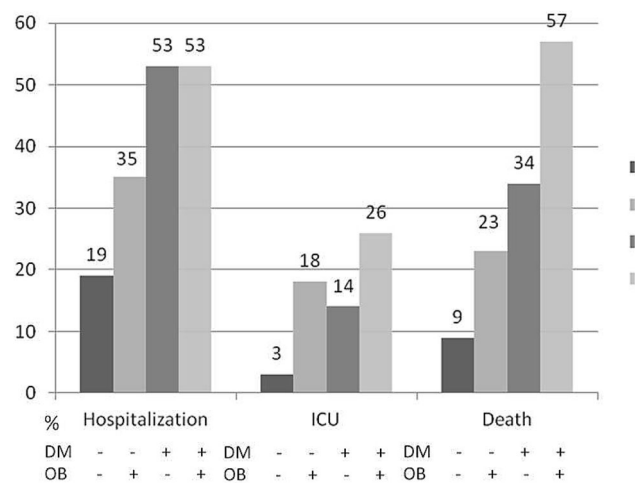
Fig. 1 Rates of hospitalization, intensive care unit admission (ICU) and death in people Sicily. Data are expressed as (%). DM diabetes mellitus; OB obesity
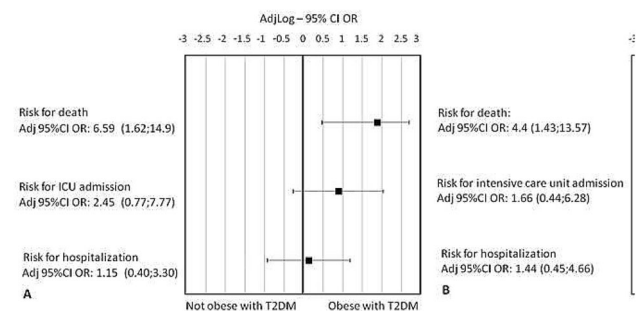

Fig. 2 Difference in risk between non obese and obese people with T2DM (A) and between obese people with or without DM (B): age- and sex-adjusted odd ratios (Binary logistic regression)

Aim Diabetes mellitus (DM) and obesity have both been associated with a higher risk for Corona Virus Disease 19 (COVID-19) severe disease course and mortality. The aim of our study was to assess whether obesity was a further risk factor for severe COVID-19 in people with DM, and DM in those with obesity.

Methods retrospective observational study on all SARS-CoV-2 positive (SARS-CoV-2$^+$) cases in Sicily, up to 2020, May 21st. Data were obtained from the Italian SARS-CoV-2$^+$ surveillance system, which is coordinated by the Italian National Institute of Health and managed in Sicily by the Sicilian Epidemiologic Observatory.

Results Out of 2772 SARS-CoV-2 + patients (49.4% males), 21.54% were admitted to hospital, 4.4% needed Intensive Care Unit (ICU), 10.89% died. Among 172 SARS-CoV-2 + patients with DM (mean age 72.86 years, 54% males), 54.7% were hospitalized, 15.7% were admitted to ICU, 37.2% died, Patients with DM showed a higher risk for hospitalization [Relative Risks with 95% confidence intervals (95% CI RR) 2.86 (2.44–3.34)], ICU admission [5.43 (3.30–8.95)], and death [4.07 (3.23–5.11)] than those without. SARS-CoV-2 + obese patients were 85 (mean age 61.53, 51% males); of those, 38.8% were hospitalized, 20% were admitted to ICU, 30.6% died, with a higher risk for hospitalization [3.12 (2.22–4.28)], ICU [5.43 (3.30–8.95)], and death [3.12 (2.22–4.28)]. SARS-CoV-2 + obese patients with DM had a higher ICU admission rate and Case Fatality Ratio than either the non obese SARS-CoV-2 + with DM or the SARS-CoV-2 + obese without DM, and a higher hospitalization rate

than the SARS-CoV-2 + obese without DM (Fig. 1). Age and sex adjusted binary logistic regression models showed that, in SARS-CoV-2^{+} people with DM, obesity was a risk factor for death [Adjusted 95% CI odds ratio: 6.59 (1.62–14.9, p = 0.005)], but not for hospitalization or ICU admission; in SARS-CoV-2^{+} obese people, DM was a significant risk factor for death [4.4 (1.43–13.57), p = 0.01], but not for hospitalization or ICU admission (Fig. 2).

Conclusion DM and obesity were both risk factors for either COVID-19 hospitalization, ICU admission and death; the risk for death for COVID-19 was further increased in those affected from both DM and obesity.

P3-1

TRANSGENIC UNACYLATED GHRELIN OVEREXPRESSION LOWERS ADIPOCYTE EXPANSION MARKERS WHILE IMPROVING MITOCHONDRIAL FUNCTION AND INSULIN SENSITIVITY IN WHITE ADIPOSE TISSUE OF OBESE MICE

G. Gortan Cappellari[1], R. Caporale[1], A. Semolic[1], F. Kharrat[1], E. Angelino[2], M. Zanetti[1], A. Graziani[2], R. Barazzoni[1]

[1]*Department of Medical, Surgical and Health Sciences, University of Trieste, Italy Trieste,* [2]*Università Vita-Salute San Raffaele Milano*

Background Besides absolute fat mass quantity, in obese patients dysfunctional adipose tissue with fat cell hypertrophy importantly increases metabolic risk including the development of type 2 diabetes. Recent evidence shows that adipocyte expansion both causes and is sustained by disrupted cell metabolism, with reduced mitochondrial function and insulin signaling. In obese rodent models, the unacylated form of the gastric hormone ghrelin (UnAG) increases skeletal muscle mitochondrial function and insulin signalling. However, its potential effects on adipose tissue metabolism are currently unknown.

Methods We investigated the effect of cardiac transgenic UnAG overexpression (Tg; 30-fold increase in plasma UnAG) vs. wild type (Wt) on body weight gain, adipose tissue (epididymal pads) mass, an adipocyte expansion marker (actin levels in F-form enriched fraction) as well as mitochondrial function (citrate synthase activity) and insulin signalling (AKT and GSK3beta by western blot) in male 6 week-old mice fed with high-fat (HF; 60% fat) or control diet (Con) for 16 weeks (n = 6/group).

Results HF-induced body weight gain, adipose tissue mass and cumulative food intake were comparable between TgHF and WtHF (all p = NS). However, TgHF had a lower increase in assessed cell expansion marker compared to WtHF (all p < 0.05). UnAG overexpression also prevented HF-induced reduction of citrate synthase activity and AKR and GSK3beta activation (p < 0.05 vs. WtHF, p = NS vs WtCon) in adipose tissue.

Conclusions In mouse white adipose tissue, constitutive UnAG overexpression prevents obesity-associated lower mitochondrial function and insulin sensitivity, in association with lower adipocyte expansion marker. These findings support the hypothesis that UnAG could potentially play a negative role in the modulation of adipose-related metabolic complications of obesity.

P3-2

4-DAY ACYLATED GHRELIN TREATMENT LOWERS MITOCHONDRIAL FUNCTION AND INSULIN SIGNALLING IN HEALTHY RAT ADIPOSE TISSUE

G. Gortan Cappellari[1], A. Semolic[1], F. Kharrat[1], R. Caporale[1], M. Zanetti[1], R. Barazzoni[1]

[1]*Department of Medical, Surgical and Health Sciences, University of Trieste, Italy Trieste*

Background Acylated ghrelin (AG) is a gastric orexigenic hormone with a relevant role in the regulation of intermediate metabolism. In skeletal muscle, in several models including in vitro as well as healthy and diseased rodents, AG enhances mitochondrial function and insulin signalling, in association with variable reduction of tissue inflammation and redox balance. In the liver, AG improves redox state and gluconeogenesis, limits fat accumulation and reduces insulin signalling without modifying mitochondrial function. However, AG effects on adipose tissue metabolism are largely undefined.

Methods We investigated the impact of four days AG s.c. administration in 12-week-old male healthy Wistar rats (AGT; n = 8; twice-a-day 200 ng s.c. non orexigenic dose) compared to vehicle (Con; n = 8) on retroperitoneal adipose tissue (AT) mitochondrial enzyme activities (citrate synthase and cytochrome c oxidase), oxidized/total glutathione, cytokine levels (xMAP bead assay) and insulin sensitivity (AKT and GSK phosphorylation by western blot).

Results Cumulative food intake and body weight was similar among groups. Compared to Con, AGT had lower (p < 0.05) mitochondrial enzyme activity but similar (p = NS) inflammatory cytokine profile and redox state. In AGT, insulin signalling activation was lower at AKT level (P < 0.05), with a similar trend for GSK (p = 0.08).

Conclusions In rat adipose tissue, sustained acylated ghrelin treatment lowers mitochondrial function and insulin sensitivity. Since in adipose tissue decreased insulin sensitivity and mitochondrial function both lower energy storage by decreasing lipogenesis, these findings are consistent with other reports that suggest a potential adaptative role for AG during starvation.

P3-3

AN ESSENTIAL AMINO ACID DEFINED-DIET PREVENTS AND REVERSES OBESITY IN MALE BUT NOT FEMALE MICE

C. Ruocco[1], C. Ruocco[2], M. Ragni[1], F. Manca[1], L. Tedesco[1], I. Severi[3], S. Abbatelli[3], S. Cinti[3], A. Giordano[3], R. Coppari[4], M. O. Carruba[1], A. Bartolomucci[2], A. Valerio[5], E. Nisoli[1]

[1]*Center for Study and Research on Obesity, Department of Biomedical Technology and Translational Medicine, University of Milan Milan,* [2]*Department of Integrative Biology and Physiology, University of Minnesota Medical School Minneapolis,* [3]*Department of Experimental and Clinical Medicine, University of Ancona (Politecnica delle Marche) Ancona,* [4]*Department of Cell Physiology and Metabolism, University of Geneva Geneva,* [5]*Department of Molecular and Translational Medicine, Brescia University, Brescia, Italy Brescia*

Modification of feeding habits may represent a promising anti-obesity therapy. A growing body of evidence suggests that food can be considered a cocktail of hormonally-active molecules (e.g., amino acids, AA), involved in regulating multiple signalling pathways. Selective manipulation of dietary AA (e.g., leucine) modulates metabolism and body weight in a sex-dependent manner. Females are generally less susceptible to obesity and the beneficial effects of dietary protein manipulation. However, inconsistent findings were reported, and the involved mechanisms are incompletely understood.

We investigated the effect of a designer dietary approach in male and female C57BL6/N mice, fed ad libitum with one of 4 diets: (1) SFA: a diet with a high ratio of saturated to unsaturated fatty acids, which leads to obesity and glucose homeostasis impairments after prolonged consumption (20 weeks); (2) SFA-EAA: a new designer diet, isocaloric, isolipidic, isonitrogenous to SFA, in which the protein component (i.e., casein) was almost entirely replaced by a defined free essential AA (EAA) formula; (3) SFA-CAA: an additional control diet, in which casein was substituted with the free AA designed on the casein profile, and (4) chow diet. Our data show apparent effects of the SFA-EAA diet in preventing and reversing obesity and

dysregulated glucose homeostasis only in male mice. Mechanistically, this diet affects multiple targets: (i) sympathetic innervation and thermogenic program of brown fat; (ii) hepatic lipid metabolism, and (iii) gut microbiota profile. Our results suggest the importance of considering sex as a critical biological variable in explaining how nutrients can affect metabolic health.

P3-4
SARS-COV-2 AND SGBS ADIPOCYTES: A MODEL TO INVESTIGATE THE METABOLIC DYNAMICS OF COVID 19 DISEASE

A. Dattilo [1], P. Quaranta[2], R. Bizzarri [3], B. Storti [4], G. Scabia[5], L. Quintino[6], C. Di Primio[7], F. Santini[6], A. Gastaldelli[5], M. Costa[7], M. Pistello[2], M. Maffei[5]

[1]Scuola Superiore Sant'Anna Pisa, [2]Ricerca traslazionale e delle nuove tecnologie in Medicina e Chirurgia Pisa, [3]Scuola Normale Superiore PISA, [4]Nanoscienze-CNR Pisa, [5]IFC-CNR Pisa, [6]Medicina Clinica e Sperimentale Pisa, [7]IN-CNR Pisa

As Covid-19 spreads through human communities with different genetic and environmental backgrounds, resulting in variable susceptibility and clinical outcomes, it is becoming evident that this disease is not limited to the respiratory system and that other organs can be affected with unexpected and silent deterioration. Epidemiological studies indicate, among others, a higher incidence of the Covid-19 disease and a much worst prognosis in obese subjects. Interesting to observe is that secondary worsening of Covid-19 is associated with high systemic inflammation including TNF-α and IL-6, two cytokines more abundant in obese people and, that angiotensin-converting enzyme 2 (ACE2), a key receptor for SARS-CoV-2 entry into the cell, is abundantly expressed in WAT. No direct evidence demonstrating the capacity of SARS-CoV2 to infect adipocytes has been provided and we do not know the response of this cell type to this specific viral insult. The present study aimed to establish an in vitro model to investigate: (1) SaRS-CoV2 capacity to infect adipocytes and (2) the effects of the viral insult on adipocyte function. To this end, we employed the human cell line SGBS (Simpson Golabi Behmel Syndrome) which, when treated with an appropriate hormonal cocktail, differentiates into adipocytes. We proved by western blot analysis and real-time PCR that these cells, when differentiated, express ACE2 and consistently, we were able to infect SGBS adipocytes with SARS-CoV-2 as proved by immunodetection of the viral nucleocapside protein. ACE2 was much less abundant in undifferentiated cells and infection was not successful. We next investigate the effects of the infection which resulted in the altered size of the lipid droplets and increased expression of inflammatory markers as detected by quantitative real-time PCR.

Our results demonstrate that mature adipocytes can be a target of SARS-CoV-2 infection and that the virus exerts effects on cell function. Further developments of this model may add important knowledge for a more in-depth understanding of COVID-19 progression, and the elevated risk of its worsening during obesity.

P3-5
SIRT5 INHIBITION PROMOTES A BROWN ADIPOCYTE-SPECIFIC PHENOTYPE IN CULTURED MOUSE ADIPOCYTES

A. Feraco[1], F. Molinari[2], V. Marzolla[1], S. Mirabilii[3], L. Sansone[4], M. A. Russo[5], M. R. Ricciardi[3], A. Tafuri[6], M. Tafani[2], A. Armani[7], M. Caprio[7]

[1]Laboratory of Cardiovascular Endocrinology, IRCCS San Raffaele Roma, Roma, [2]Department of Experimental Medicine, Sapienza University of Rome, Roma, [3]Department of Clinical and Molecular Medicine, Sapienza University of Rome, Roma, [4]Department of Cellular and Molecular Pathology, IRCCS San Raffaele, Roma, [5]Department of Cellular and Molecular Pathology, IRCCS San Raffaele; MEBIC Consortium, San Raffaele Rome Open University, Roma, [6]Department of Clinical and Molecular Medicine, Sapienza University of Rome; Hematology, "Sant' Andrea" University Hospital, Sapienza University of Rome, Roma, [7]Laboratory of Cardiovascular Endocrinology, IRCCS San Raffaele Roma; Department of Human Sciences and Promotion of the Quality of Life, San Raffaele Roma Open University, Roma

Increased activity of brown adipose tissue (BAT) promotes energy expenditure and improves glucose metabolism. Several studies have suggested that BAT activation is associated with protection against adipose tissue dysfunctions and glucose metabolism disorders, and may represent an attractive anti-obesity and anti-diabetic therapy. Sirtuin 5 (SIRT5) regulates adipogenic transcription factors expression and mitochondrial function in BAT. We analyzed SIRT5 expression in different mouse adipose depots. During the early stages of in vitro differentiation, we treated 3T3-L1 preadipocyte and mouse primary preadipocyte cultures with the SIRT5 inhibitor MC3482, to investigate the effects of this compound on adipogenesis and adipocyte function. Increased transcript levels of brown fat markers (UCP-1, CIDEA, PRDM16), upon treatment with MC3482, were observed at the terminal stage of differentiation. In 3T3-L1 preadipocytes treated with MC3482, higher levels of PPAR-γ, UCP-1 and PGC-1α proteins confirmed that SIRT5 inhibition was able to promote brown adipogenesis. Oxygen consumption rate (OCR) analyses were also performed in adipocyte cultures, to investigate mitochondrial function, showing increase both in maximal respiration and in spare respiratory capacity by treatment with MC3482. Notably, MC3482 resulted in phosphorylation of AMP-activated protein kinase (AMPK) at Thr172 and ULK1 at Ser555, with a parallel increase in LC3-II protein levels, indicating that inhibition of SIRT5 was able to stimulate mitophagy in the adipocyte. AMPK represents a cellular energy sensor, and its activation has been shown to promote mitophagy to maintain mitochondrial quality in BAT. TEM analyses confirmed such effects of MC3482 on autophagic/mitophagic flux. In addition, MC3482 treatment led to reduction in intracellular lipid droplet size, which resulted from increased expression of adipose triglyceride lipase (ATGL). Increase in activity of ATGL is expected to release fatty acids that promote UCP-1 function and mitochondrial uncoupling in brown adipocytes. Taken all together, our data show that SIRT5 inhibition stimulates brown adipogenesis in vitro, suggesting that MC3482 may promote BAT function and represent a promising strategy to counteract obesity and obesity-related diseases.

P3-6
USEFULNESS OF THYROGLOBULIN ANTIBODIES TESTING IN EVALUATION OF THE THYROIDAL STATUS IN ADULT SUBJECTS WITH OBESITY

P. Fierabracci[1], G. Scartabelli[1], S. Bechi Genzano[1], A. Basolo[1], G. Salvetti[1], J. Vitti[1], A. Calderone[1], C. Lippi[1], A. Meola[1], G. Ceccarini[1], F. Santini[1]

[1]Obesity and Lipodystrophy Center, Endocrinology Unit, University Hospital of Pisa, Pisa, Italy

Obesity may lead to several hormonal changes. Concomitant endocrine diseases may also be present, which need to be identified and to receive proper treatment. Increase levels of serum TSH without any sign of thyroid disease (isolated hyperthyrotropininemia, IH) can be frequently observed in subjects with obesity (OB), are directly associated with Body Mass Index and are reversible following weight

loss. On the other hand, autoimmune hypothyroidism, the most frequent endocrine disease in the general population, is usually progressive and needs proper replacement treatment with L-thyroxine. In 2020, the European Society of Endocrinology has published the clinical practice guidelines for the endocrine work-up in obesity, and recommends that thyroid function tests have to be performed in OB to rule out thyroid dysfunction. We performed a retrospective study aimed at investigating the prevalence of thyroglobulin antibodies (TgAb) and thyroperoxidase antibodies (TPOAb) in a cohort of adult OB, to address their role in the differential diagnosis of IH. Exclusion criteria were hyperthyroidism, previous thyroidecomy or 131 I therapy for hyperthyroidism, hemiagenesis and lithium induced-hypothyroidism. Among selected 695 OB, TgAb were found in 87 subjects: 49/87 were hypothyroid on L-T4 treatment or displayed elevated serum TSH at the time of their first evaluation. Detailed results are reported in the table below.

Prevalence of already diagnosed hypothyroidism or hyperthyrotropinemia in OB grouped based on the presence of serum TgAb and/or TPOAb.

TgAb−/ TPOAb−	TgAb+TPOAb−	TgAb−TPOAb+	TgAb+/ TPOAb+
82/554 (14.8%)	9/23 (39.1%)	25/54 (46.5%)	40/64 (62.5%)

In conclusion, our results confirm a high prevalence of autoimmune thyroiditis (20%) in OB. Furthermore, they indicate that TgAb may be associated with hypothyroidism in the absence of TPOAb. We suggest that TgAb measurement should be considered to monitor thyroid function in OB, in order to avoid missing a proportion of subjects that may have or may develop primary hypothyroidism requiring specific substitutive treatment.

P3-7
EVALUATION OF MRI INTENSITY AND PITUITARY VOLUME IN RELATION TO THE GH/IGF1 AXIS IN SUBJECTS WITH OBESITY: OBSERVATIONAL, CROSS-SECTIONAL, CONTROLLED STUDY

D. Masi[1], R. Risi[1], M. Watanabe[1], A. Balena[1], A. Caputi[1], R. Tozzi[2], M. E. Spoltore[1], R. Rossetti[1], E. Gangitano[1], S. Mariani[1], C. Lubrano[1], L. Gnessi[1]

[1]Department of Experimental Medicine, Section of Medical Pathophysiology, Food Science and Endocrinology, Sapienza University of Rome Rome, Italy, [2]Department of Molecular Medicine, Sapienza University of Rome Rome, Italy

Background Adult-onset growth hormone deficiency (GHD) is relatively common in patients with obesity with worse metabolic profile.Magnetic Resonance Imaging (MRI) pituitary findings may reflect specific endocrine alterations, as for adult-onset GHD, associated with lower pituitary height and volume (PV).
Purpose Our aim was to evaluate the pituitary gland through MRI in adult patients with concomitant signs or symptoms suggestive for GHD.
Methods We conducted a retrospective evaluation of 168 patients undergoing a pituitary-MRI and a dynamic test (GHRH + arginine) for suspected GHD admitted from 2015 to 2021. Clinical history and anthropometric parameters were collected. Mean and standard deviation (SD) of pituitary signal intensity was quantified (Horos, Nimble Co, Annapolis, MD USA). Gray matter signal intensity was used as a normalizer. PV was calculated by adopting the ellipsoid formula.
Results Of 168 patients, 126 had obesity (BMI: 39 ± 6 kg/m^2), 26 were overweight (BMI: 28 ± 1 kg/m^2), 13 normal weight (BMI: 22 ± 2 kg/m^2). A significant difference in GH response upon dynamic testing was observed between those with obesity and overweight ($p < 0.0001$). Moreover, there was a significant difference in mean PV between those with obesity and normal-weight patients ($p < 0.0001$). Finally, an inverse correlation between BMI and PV was observed ($r = -0.2844$, $p < 0.0001$). Of note, after normalization with grey matter intensity, T2-weighted-scan derived pituitary intensity and PV showed an inverse correlation ($r = -0.2761$, $p = 0.008$).
Conclusion In line with current evidence, our work demonstrates that patients with obesity show a greater GH-IGF1 axis impairment and reduced PV. Furthermore, we found an inverse correlation between PV and pituitary intensity. This increase in pituitary intensity may reflect the presence of an inflammatory infiltrate possibly leading to pituitary damage and subsequent shrinkage, although this hypothesis should be confirmed with ad hoc studies.
Keywords Obesity, Pituitary volume, Growth Hormone Deficiency.

P3-8
PITUITARY FEATURES PREDICT ADULT-ONSET GROWTH HORMONE DEFICIENCY IN PATIENTS WITH OBESITY AND OVERWEIGHT: A POTENTIAL TOOL GUIDING SUBSEQUENT DIAGNOSTIC TESTING

R. Risi[1], D. Masi[1], M. Watanabe[1], A. Balena[1], A. Caputi[1], R. Tozzi[2], M. E. Spoltore[1], R. Rossetti[1], S. Mariani[1], L. Gnessi[1], C. Lubrano[1]

[1]Dipartimento di Medicina Sperimentale, V Clinica Medica, Policlinico Umberto I Roma, [2]Dipartimento di Medicina Molecolare, Policlinico Umberto I Roma

Background In patients with obesity, Empty Sella Syndrome (ESS) is a common Magnetic Resonance Imaging (MRI) finding. Approximately one third of these individuals are also diagnosed with adult-onset growth hormone deficiency (GHD), associated with worse metabolic profile. Identifying pituitary morphological factors predicting GHD may help clinicians stratify and promptly test individuals at risk for GHD.
Purpose Our aim was to identify the pituitary morphological alterations predicting GHD in subjects with obesity or overweight.
Methods We conducted a retrospective evaluation of 157 patients undergoing a pituitary-MRI and a dynamic test (GHRH + arginine) for suspected adult-onset GHD from January 2015 to March 2021. Clinical history and anthropometric parameters were collected. Standard criteria (cerebrospinal fluid occupying more than 50% of ST with compressed pituitary gland against the sellar wall) were adopted for MRI diagnosis of ESS.
Results Of 157 patients, 131 had a BMI compatible with obesity (BMI 39 ± 6 kg/m^2), 26 were overweight (BMI 28 ± 1 kg/m^2). Individuals with obesity presented a higher prevalence of ESS compared to those who were overweight ($p = 0.005$). As far as GH secretory capacity is concerned, we found a direct correlation between the area under the curve of the dynamic test and pituitary volume (PV) ($R = 0.41488$, $p < 0.0001$). Finally, a receiver operating characteristic (ROC) curve allowed to identify a $PV < 75.8$ ml and a pituitary height < 3.7 mm as predictors of GHD with a sensitivity of 86.1% and 72.2% and a specificity of 63.6% and 64.5%, respectively.
Conclusion An inverse correlation between PV and GH secretory capacity was identified. When subjects suffering from overweight/ obesity undergo a head MRI for other reasons and an ESS is observed, those not reaching the identified cut off values of PV and pituitary

height predicting GHD in our cohort might benefit from undergoing dynamic testing in order to assess for eventual GHD.

P3-9

GROWTH HORMONE SECRETORY CAPACITY AND BONE HEALTH INDICES IN OVERWEIGHT AND OBESE FEMALE PATIENTS

E. Gangitano[1], A. Caputi[1], A. Balena[1], R. Rossetti[1], M. E. Spoltore[1], R. Tozzi[2], D. Masi[1], R. Risi[1], M. Watanabe[1], S. Mariani[1], L. Gnessi[1], C. Lubrano[1]

[1]Department of Experimental Medicine, Sapienza University of Rome Rome, [2]Department of Molecular Medicine, Sapienza University of Rome Rome

Introduction Growth Hormone (GH) secretion impairment, or a proper growth hormone deficit (GHD), can be not uncommonly found in obese patients, and may negatively impact bone quality parameters.

Objective of the study Our aim was to investigate the relationship between GH secretory capacity and bone quality indices, as bone mineral density, trabecular microarchitecture and bone geometry, in overweight and obese female adult patients.

Materials and methods 276 overweight or obese female patients referred to the High Specialization Center for the Care of Obesity, Umberto I Polyclinic, who presented with clinical features suspected for GHD were enrolled in the time-frame 2014–2019. Patients' GH secretory capacity was studied with GHRH + Arginine stimulation test and diagnosis of GHD was formulated according to Body Mass Index (BMI)-specific cut-off values. A dual energy X-ray absorptiometer Hologic-Discovery A was used to evaluate bone health indices.

Results 97 patients were diagnosed with GHD and 179 patients with normal GH secretion were considered our control group. We observed a partially degraded lumbar spine microarchitecture both in the GHD group and in the control group. In GHD patients we observed a significantly reduced Trabecular Bone Score (p = 0.01). On the other hand, GHD patients had some femur microarchitectural parameters apparently better respect to the controls, but these results were reverted after correction for BMI, confirming a negative effect of GHD on bone quality. Of note, many bone quality parameters were positively correlated to GH secretory capacity.

Conclusions Trabecular Bone Score and Hip Structural Analysis, expression of bone quality, correlate with GH stimulated secretory capacity. GHD may act as an additive factor in the alteration of bone microarchitecture in obese patients, which already are at higher risk for fractures. Weight excess may mask the detrimental effects of GHD on bone microarchitecture. Further studies with bone health evaluation during GH replacement therapy are needed to better define this relationship.

P3-10

CIRCULATING BRANCHED CHAIN AMINO ACID RESPONSE TO AN ORAL FAT LOAD AND RELATIONSHIP WITH ECTOPIC HEPATIC LIPIDS IN ADULTS WITH OBESITY

E. Poggiogalle[1], M. Fontana[2], A. M. Giusti[1], F. Frigerio[1], C. Lubrano[1], M. Di Martino[3], L. Gnessi[1], S. Mariani[1], A. Lenzi[1], L. M. Donini[1]

[1]Department of Experimental Medicine, Sapienza University, Rome, Italy, [2]Department of Biochemical Sciences, Sapienza University, Rome, Italy, [3]Department of Radiological Sciences, Sapienza University, Rome, Italy

Rationale Branched chain amino acids (BCAAs) play a pivotal role in metabolic signaling. Accumulating evidence suggests that BCAAs are important mediators in metabolic disorders such as type 2 diabetes and insulin resistance. However their role in obesity and their postprandial response have been poorly investigated. The aim of the present study was to investigate the response to an oral fat load in terms of BCAA concentrations in adult subjects with obesity, and to examine the relationship between BCAAs levels and lipid metabolism postprandially.

Methods Study participants with obesity (body mass index, BMI $\geq$ 30 kg/m^2) were enrolled at the Sapienza University, Rome, Italy. An oral fat load was administered. Circulating leucine, valine, isoleucine, free fatty acids (FFAs), beta-hydroxybutirrate and acetoacetate were assessed at baseline and 3 h and 5 h postprandially. Intrahepatic lipid content (IHL) were measured by magnetic resonance spectroscopy at the same timepoints mentioned above. BCAAs were measured through HPLC.

Results Ten participants (four men and six women), age: 48.9 $\pm$ 5.1 years, BMI: 34.8 $\pm$ 1.9 kg/m^2, were included. Fasting leucine levels were negatively correlated to fasting glucose concentrations (r = $-$ 0.87, p = 0.005). Plasma valine and isoleucine peaked 2 h postprandially, whereas leucine peaked 3 h after the OFL. At 3 h postprandially leucine levels and valine levels were significantly correlated with FFAs (r = 0.90, p = 0.03), whereas leucine levels were inversely correlated with intrahepatic lipids (r = $-$ 0.83, p = 0.042). 5 h after the OFL leucine and isoleucine levels were positively correlated with acetoacetate levels (r = 0.86, p = 0.003; r = 0.91, p = 0.001).

Conclusion When considered singly, BCAAs showed different correlations with postprandial lipids and ketone bodies, as well as with ectopic lipid in the liver. The role of BCAAs in lipid partitioning in obesity needs to be further elucidated.

P3-11

PLASMA LEVELS OF CILIARY NEUROTROPHIC FACTOR ARE INCREASED IN OBESE PATIENTS AND CORRELATE WITH INFLAMMATORY AND DIABETIC INDICES

J. Perugini[1], E. Di Mercurio[1], A. Giuliani[2], J. Sabbatinelli[2], R. Gesuita[3], F. Olivieri[2], A. Giordano[1]

[1]Department of Experimental and Clinical Medicine, Marche Polytechnic University Ancona, [2]Department of Clinical and Molecular Sciences, Marche Polytechnic University Ancona, [3]Center of Epidemiology, Biostatistics, and Medical Informatics, Marche Polytechnic University, Ancona

The ciliary neurotrophic factor (CNTF) is involved in normal brain development and in pathophysiological aspects of the central and peripheral nervous system, where it can be released after injury to promote neuronal and glial survival and regeneration. CNTF administration to neurological patients induces weight loss, an effect also confirmed in leptin-resistant obese patients. In the present study, we examined whether obesity affects plasma levels of CNTF in morbidly obese patients compared to healthy normal controls.

The study involved 118 subjects (58 males, 60 females) with an average age of 60 years (IQR 56–65): 39 (19 males, 20 females) healthy and with normal body weight; 39 (19 males, 20 females) with obesity; and 40 (20 males, 20 females) with obesity and diabetes. Fasting glucose, insulin, glycated hemoglobin (HbA1c), C-reactive protein (CRP), total, HDL and LDL cholesterol and triglyceride levels were measured using routine laboratory methods. Plasma CNTF, leptin and interleukin-6 (IL6) were evaluated using commercially available ELISA kits. The correlation of CNTF levels with gender, age, body weight, body mass index (BMI), waist/hip ratio (WHR) and

blood inflammatory and diabetic parameters were evaluated by a non-parametric analysis.

Plasma CNTF levels were found to be higher in male and female obese and obese diabetic patients than in healthy subjects: in all three experimental groups, females exhibited higher CNTF levels than males. Differently to females, obese diabetic males exhibited higher CNTF levels than obese subjects, even whether the difference was not significant. CNTF levels did not correlate with age, but they positively correlated with obesity (BMI, waist/hip ratio, leptin), diabetic (glucose, insulin, HOMA-index and HbA1c) and inflammatory (IL6 and PCR) indices in each experimental group.

These findings demonstrate for the first time that human obesity is associated with high plasma CNTF levels, that may have a role in counteracting obesity-induced tissue damage. Future studies performed in a higher number of subjects and in more selected patients may reveal circulating CNTF a potential novel diagnostic and/or prognostic marker for obesity, diabetes and/or associated diseases.

P4-1

EFFICACY OF NALTREXONE/BUPROPION TREATMENT IN PATIENT WITH WEIGHT GAIN AFTER SMOKING CESSATION

F. Muratori[1], M. Del Prete[1], G. Di Sacco[1], D. Pellegrino[2], L. Gavazzi[1], F. Vignati[1]

[1]Division of Endocrinology and Diabetology, Sant'Anna Hospital-ASST Lariana Como, Italy, [2]Division of Geriatrics, Sant'Anna Hospital-ASST Lariana Como, Italy

Introduction Naltrexone/bupropion (N/B) stimulate central melanocortin pathways and antagonize inhibitory feedback loops that limit weight reduction, leading to improved energy expenditure and reduced appetite. Mesolimbic reward circuit represents a second mechanism through which N/B act on eating behavior. Here, we reported efficacy of N/B therapy in 23 patients who gained weight after smoking cessation (SC).

Patients and methods We retrospectively evaluated 23 patients (22 F-1 M; mean age: 47.5 ± 9.4 years) who gained weight after SC, treated with N/B for weight loss. N/B were administered orally at starting dose of 8 mg of N and 90 mg of B with weekly increases up to 32 mg of N and 360 mg of B. We recommended a calorie-deficient nutritional plan based on baseline requirement of 500–1000 kcal/day and advice on physical activity were provided. All patients were asked not to drink alcohol. Aim of this study was to evaluate efficacy and safety of N/B therapy in this setting of patients.

Results Body mass index (BMI) after SC was 29.9 ± 2.8 kg/m^2. After a mean of 7.9 ± 2.9 months from SC, all patients started N/B. Mean BMI was 32.9 ± 3.2 kg/m^2 (mean increased weight: 8.2 ± 2.9 kg; mean increased BMI: 3.0 ± 0.9 kg/m^2). After 8-month follow up, 3 achieved normal weight (mean BMI 22.4 ± 0.3 kg/m^2), 13 overweight (mean BMI 26.9 ± 1.3 kg/m^2); 2 grade I (BMI 31.5 ± 0.5 kg/m^2) obesity. Overall mean BMI was 26.6 ± 2.7 kg/m^2; mean weight and BMI decrease respectively of − 16.7 ± 3.6 kg and − 6.1 ± 1.2 kg/m^2. Five patients early discontinued the therapy: 4 for intolerance and 1 for drug ineffectiveness. After 12-month follow up, 9 patients were still on treatment: 4 patients had normal weight (mean BMI 23.6 ± 1.7 kg/m^2), 3 overweight (mean BMI 27.3 ± 0.3 kg/m^2) and 2 grade I (mean BMI 30.6 ± 0.2 kg/m^2) obesity.

Conclusions These data confirm the efficacy of N/B treatment on weight loss in patients who experienced weight gain after SC. The efficacy of therapy is likely to be attributed to the double action on the arcuate nucleus and the mesolimbic system.

P4-2

REAL LIFE EFFICACY OF LIRAGLUTIDE THERAPY ON WEIGHT-LOSS AND BASELINE BMI < 35 VS ≥ 35 KG/M2 IN OBESE PATIENTS: A RETROSPECTIVE STUDY OF 88 CONSECUTIVE OUTPATIENTS

F. Muratori[1], M. Del Prete[1], F. Vignati[1], D. Pellegrino[2], L. Gavazzi[1], G. Di Sacco[1]

[1]Division of Endocrinology and Diabetology, Sant'Anna Hospital-ASST Lariana Como, Italy, [2]Division of Geriatrics, Sant'Anna Hospital-ASST Lariana Como, Italy

Introduction Efficacy of liraglutide (L) on weight loss (WL) has been documented in major clinical studies as the SCALE trial. Here, we reported the effectiveness of L in association with dietary and behavioral advices, in 88 obese patients followed in our outpatient clinic. This study compared efficacy and safety of L in adults with obesity on WL and baseline BMI < 35 vs ≥ 35 kg/m^2.

Patients and methods We retrospectively evaluated efficacy and safety of L in 88 obese patients (72 F, 16 M; mean age 46.3 ± 10.5 years) with body mass index (BMI) > 30 kg/m^2 (51 patients BMI < 35; 37 patients BMI ≥ 35 kg/m^2) admitted to our observation to lose W with L. All patients were required to follow dietary and behavioral therapy with concomitant drug treatment. L was administered once-daily subcutaneously at starting dose of 0.6 mg with weekly increases up to 3.0 mg. Aim of this study was to compare efficacy and safety after 6, and 12 months of treatment with L in obese patients with BMI < 35 vs ≥ 35 kg/m^2.

Results At baseline, patients with BMI < 35 and ≥ 35 respectively had mean W of 86.5 ± 8.3 kg and 111.7 ± 16.4 kg. Mean BMI was respectively 32.1 ± 1.5 kg/m^2 and 39.9 ± 5.0 kg/m^2. After 6-month follow up, 41 patients with BMI < 35 and 34 patients with BMI ≥ 35 achieved respectively a mean W of 74.0 ± 8.6 kg and 96.3 ± 13.8 kg and mean BMI of 27.5 ± 2.2 kg/m^2 and 34.4 ± 4.3 kg/m^2, with a mean percentage (%) W and mean BMI reduction respectively of − 14.4 ± 5.5%, − 13.7 ± 4.3%, − 4.6 ± 1.8 kg/m^2 and − 5.5 ± 2.0 kg/m^2. In BMI < 35 group 7 patients lost more than 5% and 35 patients more than 10% W, while in BMI ≥ 35 group, 1 patient lost less than 5%, 8 more than 5% and 25 more than 10% W from baseline. After 12-month follow-up, 13 patients with BMI < 35 and 19 patients with BMI ≥ 35 were still on treatment and had respectively a mean W of 69.4 ± 8.0 kg, 86.6 ± 12.1 kg and mean BMI of 25.3 ± 2.0 kg/m^2 and 31.2 ± 4.2 kg/m^2, with a mean % W and mean BMI reduction respectively of − 28.2 ± 9.6%, − 29.4 ± 8.4%, − 7.0 ± 1.9 kg/m^2 and − 9.1 ± 2.4 kg/m^2 from baseline. Overall, 6 and 4 patients discontinued L due to response failure and cost reasons. L was well tolerated: only 3 patients experienced mild adverse events as nausea and vomiting.

Conclusions Our results confirm efficacy and safety of real-life therapy with L in obesity. Our real-life results show that L therapy had similar efficacy on WL in patients with BMI < and ≥ 35 kg/m^2.

P4-3

REAL-LIFE EFFICACY OF LIRAGLUTIDE THERAPY ON WEIGHT-LOSS IN OVERWEIGHT PATIENTS WITH COMORBIDITIES

M. Del Prete[1], G. Di Sacco[1], F. Vignati[1], D. Pellegrino[2], L. Gavazzi[1], F. Muratori[1]

[1]Division of Endocrinology and Diabetology, Sant'Anna Hospital-ASST Lariana Como, Italy, [2]Division of Geriatrics, Sant'Anna Hospital-ASST Lariana Como, Italy

Introduction In real-life setting most obese or overweight adults receive pharmacotherapy to obtain clinically relevant weight loss (WL). Here, we reported the effectiveness of liraglutide (L) in association with dietary and behavioral advices, in overweight patients followed in our outpatient clinic.

Patients and methods We retrospectively assessed 21 overweight patients (20 F; 1 M; mean age 50.1 ± 10.1 years) admitted to our observation to lose W with L. Of these, 8 had dyslipidemia, 8 hypertension (AHT), 5 impaired glucose tolerance (IGT). AHT patients were on antihypertensive drugs, none of patients with dyslipidemia were on statins. All patients were required to follow dietary and behavioral therapy with concomitant drug treatment. L was administered once-daily subcutaneously at starting dose of 0.6 mg with weekly increases up to 3.0 mg. Aim of this study was the evaluation of efficacy and safety of L therapy in patients with BMI < 30 kg/m^2.

Results At baseline, mean W was 77.6 ± 8.6 kg and mean body mass index (BMI) was 28.0 ± 1.0 kg/m^2. After 4-month follow up, all patients were still on treatment and achieved a mean W of 69.6 ± 8.9 kg and mean BMI of 25.1 ± 1.5 kg/m^2, with a mean percentage (%) W and mean BMI reduction of $- 10.4 \pm 3.7\%$ and $- 2.9 \pm 1.0$ kg/m^2. Seven patients lost more than 5% and 13 patients more than 10% of W. After 6-month follow up, 18 patients had a mean W of 66.5 ± 7.6 kg and mean BMI of 24.0 ± 1.4 kg/m^2, with a mean %W and mean BMI reduction respectively of $- 14.4 \pm 3.4\%$ and $- 4.0 \pm 1.0$ kg/m^2. Two patients lost more than 5% and 16 patients more than 10% of W. Of 18 patients, 15 (83.3%) achieved normal BMI from baseline, 3 patients were still overweight. Of these, 1 patient was lost to follow up and 2 patients achieved normal BMI at 8-month follow-up. After 12-month, 2 patients were still on treatment with L. All IGT patients achieved normalized glycemic values and glycated hemoglobin; Oral Glucose Tolerance Test (OGTT) showed remission of IGT. L was well tolerated, only 1 patient experienced mild adverse events as nausea and vomiting.

Conclusions Our results show efficacy and safety of real-life therapy with L in overweight patients. The adherence to the therapy and the high % of WL are related to the effectiveness of L and the motivation of patients to lose W. WL improved comorbidities in all patients, with disease remission in IGT patients.

P4-4

REMISSION DISEASE AFTER INTENSIVE WEIGHT LOSS IN NEW ONSET DIABETES PATIENTS TREATED WITH SEMAGLUTIDE THERAPY AND LIFESTYLE INTERVENTION

F. Vignati[1], M. Del Prete[1], G. Di Sacco[1], D. Pellegrino[2], L. Gavazzi[1], F. Muratori[1]

[1]*Division of Endocrinology and Diabetology, Sant'Anna Hospital-ASST Lariana Como, Italy,* [2]*Division of Geriatrics, Sant'Anna Hospital-ASST Lariana Como, Italy*

Introduction Currently the long acting GLP-1 analogue, semaglutide (S), is indicated for the treatment of adults with type 2 diabetes mellitus as an adjunct to diet and exercise. S is also waiting for approval by the European Medicines Agency (EMA) for the long-term treatment of obesity or overweight. Here, we report the efficacy of S, either alone or in combination with other antidiabetic drugs in obese T2DM patients.

Patients and methods We retrospectively evaluated 36 obese diabetic patients (16 F; 10 M; mean age: 60.3 ± 9.7 years) treated with S for WL and glycemic control. Of these, 12 patients had recent onset diabetes (less than 6 months) and 24 comorbidities as arterial hypertension and dyslipidemia. S was administered as monotherapy

or in combination with metformin or other antidiabetic drugs. S was administered once-weekly subcutaneously at starting dose of 0.25 mg and with monthly increases up to 1.0 mg. All patients were required to follow dietary and behavioral therapy with concomitant drug treatment. Aim of this study was to evaluate efficacy and safety of S in this setting of patients.

Results At baseline, mean W was 99.9 ± 21.0 kg and mean body mass index (BMI) was 36.1 ± 7.2 kg/m^2. After 12-month follow up, patients achieved a mean W of 92.1 ± 20.7 kg and mean BMI of 33.3 ± 7.1 kg/m^2, with a mean W and mean BMI reduction respectively of $- 7.8 \pm 7.6$ kg and $- 2.8 \pm 2.8$ kg/m^2. At baseline mean glycated hemoglobin (HbA1c) was of $7.5 \pm 1.3\%$ and after 12-month follow up was $6.3 \pm 0.9\%$, with a mean percentage reduction of $- 1.2 \pm 0.9\%$. All patients had improved HbA1c, while new onset diabetes patients achieved normalized glycemic values and HbA1c (mean HbA1c $5.6 \pm 0.4\%$). S was well tolerated, and no patients experienced severe adverse events as nausea and vomiting.

Conclusions Our real-life results confirm the efficacy and safety of S therapy in obese diabetic patients. Furthermore, these data show that S induces not only improvement in HbA1c but also remission of the disease in patients with a recent onset of diabetes.

P4-5

EXENATIDE INDUCES A REMODELING OF PHOSPHOLIPIDS ASSOCIATED TO CARDIOMETABOLIC RISK IN NON-DIABETIC SUBJECTS WITH MORBID OBESITY

S. Sabatini[1], B. Patrício[1], F. Carli[1], B. Astiarraga[2], E. Ferranini[1], S. Camastra[2], A. Gastaldelli[1]

[1]*Istituto di Fisiologia Clinica-CNR Pisa Pisa,* [2]*Dipartimento di Mecidina Clinica e Sperimentale, Università di Pisa Pisa*

Background and aims Alteration in plasma lipidomic profile (i.e., phospholipids, like phosphocholines PC and LysoPC, and phosphoethanolamines PE and LysoPE, ceramides) has been recently associated to increased risk of cardiovascular disease (CVD) and metabolic dysfunction. Glucagon like peptide-1 receptor agonists improve cardiometabolic profile in diabetic patients. Less is known of their effects in subjects without diabetes. The aim of the study was to investigate if exenatide (EXE) improves lipidomic markers of CVD risks in non-diabetic subjects with morbid obesity.

Materials and methods 30 non-diabetic subjects (BMI = 44.36 ± 0.95 kg/m^2) were assigned (1:1 ratio) to exenatide (EXE, n = 15, 10 µg twice-daily) or diet (CT, n = 15) for 3 months, with the measurement of lipidomic profile (PL and ceramides by LCMS-QTOF and GCMS); hepatic insulin resistance (HepIR) and adipose tissue insulin resistance (AdipoIR) and insulin sensitivity (OGIS) indexes using tracers, inflammatory markers (IL-6, TNF-α, leptin). Data were analysed as delta (post–pre) with respect to baseline.

Results In EXE group we observed a significant increase of several phospholipids previously found negatively associated to CVD risk, i.e. PC(36:4), PC(38:4), PC(38:5), PC(38:6), PC(40:6), PC(P-36:4), PC(P-36:3), LysoPC(20:4), LysoPC(22:6), PE(38:4), with decreased incorporation of saturated fatty acids, while only LysoPC(18:0) was decreased. Moreover, the increase of unsaturated PL was associated to an increase of insulin sensitivity (OGIS) and a decrease in BMI, indexes of insulin resistance (HepIR and AdipoIR) and IL-6. No changes were observed in ceramide levels.

Conclusions With respect to controls, subjects treated with exenatide showed a remodeling of plasma phospholipids versus increase in unsaturated PCs and LysoPCs, previously found protective from CVD and here found associated with improvements in insulin resistance.

P4-6
MULTIDIMENSIONAL APPROACH PRE AND POST BARIATRIC SURGERY

E. Morini[1], L. Bonanno[2], F. Corallo[2], L. Lucchese[2], F. Iaropoli[2], V. Lombardo[2], A. Todaro[2], P. Bramanti[2]

[1]IRCCS Centro Neurolesi Bonino Messina, [2]IRCCS Centro Neurolesi Bonino Pulejo Messina

Introduction Obesity is a major risk factor for the development of diabetes, heart disease and is a major cause of preventable death. Surgical therapy of obesity is indicated in patients with BMI > 40 kg/m^2 or a BMI > 35 kg/m^2 if associated comorbidities (type2 diabetes, OSAS obstructive sleep apnea syndrome, disabling weight-bearing arthropathy, resistant hypertension). Weight loss achieved by bariatric surgery is associated with a significant improvement in mortality and comorbidity. Prescribing a preoperative diet may be helpful in controlling diabetes and other comorbidities associated with obesity and reducing operative risk. This study describes the preoperative preparation and workup of patients with obesity undergoing bariatric surgery and the role of interprofessional team evaluation during the peri-operative period. *Material and methods* We enrolled 60 obese patients recruited from our clinic of endocrinology and diabetology. All the eligible subjects were assessed at admission (T0) and six months later bariatric surgery (T1). The patients were divided into two groups: patients with caregiver Group (n. 30 subjects) and patients without caregiver Group (n. 30 subjects). Each subject was evaluated using validated instruments. Patients underwent a text evaluation to investigate psychological and clinical outcomes before and after bariatric surgery.
Results Intra-group analysis showed a significant increase of Vit-D and a significant decrease of blood glucose, insulinemia, Homa index, cholesterol and triglycerides in each group. Inter-group analysis no showed significant differences at T0, the groups are homogeneous while at T1 we highlight a significant difference in clinical variables, in particular, Vit-D (p = 0.04), blood glucose (p < 0.001), insulinemia (p < 0.001), Homa index (p = 0.03) and a significant trend of cholesterol (p = 0.06) and triglycerides (p = 0.07).
Conclusion Our results showed improvement in both groups. Considering that patients with caregiver show a more evident improvement, it can be said that caregiver support provides the beneficial effect on clinical score. In fact in this group there is a better adherence to therapy and a reduction of anxiety.

P4-7
EFFICACY AND EFFECTS OF BARIATRIC SURGERY VERSUS MEDICAL THERAPY IN THE TREATMENT OF OBESITY: META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

C. Cosentino[1], C. Marchetti[2], M. Monami[1], E. Mannucci[2], B. Cresci[1]

[1]Diabetology, Careggi Hospital Florence, Italy, [2]University of Florence Florence, Italy

Aims Bariatric surgery (BS) is recommended for subjects with a Body Mass Index (BMI) over of 40 kg/m^2 or with a BMI between 35 and 40 kg/m^2 with obesity-related comorbidities. Aim of the study was to compare BS with medical therapy (MT) for the treatment of obesity.
Methods We conducted a meta-analysis including randomized clinical trials comparing different BS techniques versus MT in people with obesity (BMI > 30 kg/m^2), with a duration ≥ 24 weeks (PROSPERO, #CRD42020160359). The principal endpoint was BMI, whereas secondary endpoints included metabolic parameters (fasting plasma glucose, total cholesterol; HDL cholesterol; triglycerides; systolic blood pleasure and diastolic blood pleasure), assessment of Quality of Life (QoL), all-cause mortality, and severe adverse events.

Mean and 95% Confidence Intervals for continuous variables, and Mantel–Haenszel Odd Ratio (MH-OR) for categorical variables were calculated, using random effect models. Types of BS included: laparoscopic adjustable gastric banding, Roux-en-Y gastric bypass, sleeve gastrectomy, bilio-pancreatic diversion; greater curvature plication; one-anastomosis gastric bypass; Laparoscopic Vertical Banded Gastroplasty and duodenal switch. 14 trials were retrieved in this metanalysis.
Results BS was associated with a significant reduction in BMI, systolic blood pressure, triglyceride and fasting glucose, and with a significant increase of HDL cholesterol when compared to MT. The number of recorded deaths was 1 (5%) and 3(7.5%) in BS and MT. A formal assessment of the effects of treatment on health-related QoL was described only in 6 trials, using several different instruments and reporting either a significant improvement with BS or no significant difference between groups.
Conclusions BS produces a greater weight loss than MT in morbidly obese patients, inducing a greater improvement of obesity-associated metabolic parameters. Available data are insufficient to assess the effect of BS on mortality.

P4-8
EFFICACY OF DIFFERENT TYPES OF BARIATRIC SURGERY IN THE TREATMENT OF OBESITY: NETWORK META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

C. Cosentino[1], C. Marchetti[2], M. Monami[1], E. Mannucci[2], B. Cresci[1]

[1]Diabetology, Careggi Hospital Florence, Italy, [2]University of Florence Florence, Italy

Aims Bariatric surgery (BS) is recommended for subjects with a Body Mass Index (BMI) over of 40 kg/m^2 or with a BMI between 35 and 40 kg/m^2 with obesity-related comorbidities. Aim of the study was to compare different types of BS with medical therapy (MT) for the treatment of obesity.
Methods We conducted a network-meta-analysis (NMA) including randomized clinical trials comparing different BS techniques versus MT in people with obesity (30 kg/m^2), with a duration ≥ 24 weeks (PROSPERO, #CRD42020160359). The principal endpoint was BMI. Mean and 95% Confidence Intervals for continuous variables, and Mantel–Haenszel Odd Ratio (MH-OR) for categorical variables were calculated, using random effect models. Indirect comparisons of different types of surgery were performed by NMA. Types of BS included: laparoscopic adjustable gastric banding (LAGB), Roux-en-Y gastric bypass, sleeve gastrectomy (SG), bilio-pancreatic diversion (BPD); greater curvature plication (GCP); one-anastomosis gastric bypass (OAGB); Laparoscopic Vertical Banded Gastroplasty (LVBG) and duodenal switch (DS. 43 trials were retrieved in this metanalysis.
Result In direct comparisons, RYGB was more effective than LAGB, LVBG, and GCP, but less effective than DS, whereas LAGB was less effective than LVBG and SG. In the NMA, DS and BPD appeared to be more effective than other procedures, whereas GCP, LAGB and LVBG produced a smaller weight loss than other interventions.
Conclusions Considering the multiplicity of comparisons, and the relatively small number of available trials for each comparison, a network meta-analysis can yield some relevant additional information. The results of this analysis should always be interpreted with caution, since some of the comparisons, unavailable in trials, are inferred from existing information from other comparisons.

P4-9

ASSOCIATION BETWEEN BARIATRIC SURGERY AND ALL-CAUSE MORTALITY AND HOSPITALIZATION RATE IN A COHORT OF PATIENTS WITH SEVERE OBESITY

A. Brunani[1], E. Migliore[2], E. Pagano[2], T. Rosso[2], G. Ciccone[2], S. Bo[3]

[1]IRCCS, Istituto Auxologico Italiano Verbania, [2]CPO, Città della Salute e della Scienza Hospital Torino, [3]Dept. of Medical Sciences, University of Torino Torino

Background Bariatric surgery (BS) is a safe and effective treatment for severe obesity, leading to a survival benefit, but uncertain effects on subsequent hospitalizations and use of sanitary resources have been reported.
Methods We compared the long-term survival and hospitalization rates of individuals with severe obesity undergoing BS towards those not undergoing BS among the patients treated within the Istituto Auxologico Italiano (IAI) during 10-year follow-up. Multivariable Cox proportional-hazards regression models and Poisson regression analyses were employed.
Results Between 2002 and 2018, a total of 2285 patients with severe obesity were enrolled in the IAI cohort. Out of them, 331 (14.5%) underwent BS. Mean follow-up time was 10.2-year, with 23,221 person-years of observation; 243 patients (11%) died, 10 (3%) in the BS group and 233 (12%) in the non-BS group. The risk of all-cause mortality was significantly lower in the BS groups in multivariable analyses (HR = 0.52, 95% CI 0.27–0.98). During follow-up, 10,762 hospital admissions occurred, 81% (n = 8707) in the non-BS group, whereas in the BS group 1344 (12.5%) pre-BS hospitalizations and 711 (6.6%) post-BS hospitalizations were recorded. No difference in the hospitalization rates between pre-BS and the group without BS was highlighted (RR = 0.90; 95% CI 0.04–18.6). On the other hand, a significant decrease in in-hospital rates was observed before-after BS (RR = 0.34; 95% CI 0.28–0.41).
Conclusion Our study highlighted a 48% reduction in all-cause mortality in patients with severe obesity submitted to BS, in line with literature. Furthermore, BS reduced by 66% the risk of hospitalization in those patients, suggesting a potential benefit in terms of public health costs.

P4-10

PRESENCE OF NAFLD AFTER RYGB IS POSITIVELY ASSOCIATED TO ERYTHROCYTE SEDIMENTATION RATE (ESR) AND FATTY LIVER INDEX (FLI)

M. Palumbo[1], C. Barbieri[2], V. Zampa[3], B. Astiarraga[1], E. Gherardini[4], F. Carli[2], S. Pezzica[2], R. Berta[4], R. Bellini[4], A. Gastaldelli[2], S. Camastra[1]

[1]University of Pisa, Department of Clinical and Experimental Medicine Pisa, [2]National Research Council (CNR), Institute of Clinical Physiology (IFC) Pisa, [3]Santa Chiara Hospital, Radiodiagnostic Unit Pisa, [4]Santa Chiara Hospital, Bariatric Surgery Unit Pisa

Background RYGB is effective in resolving nonalcoholic fatty liver disease (NAFLD) due to great weight loss. However, most of the studies were carried at 1–2 year after surgery and little is known for longer follow up. Aim of the study was to measure hepatic fat content by Magnetic Resonance (MRI) long after RYGB and identify which clinical parameters were associated to NAFLD.
Methods MRI was performed 8 years after RYGB in 22 patients (11 diabetic (T2D) and 11 non-diabetic (ND) before surgery), to measure hepatic triglyceride (HTG), visceral (VF) and subcutaneous fat (SC). MRI data was compared to Fatty Liver Index ((FLI) that uses BMI, Waist WC, gamma-glutamyl transferase GGT, Triglycerides (TG)),

erythrocyte sedimentation rate (ESR) and others biochemical parameters.
Results After RYGB all subjects were ND; 8 were no-NAFLD (HTG < 5.5%), 7 Moderate NAFLD (M-NAFLD; HTG 5.5–20%), 7 Severe NAFLD (S-NAFLD, HTG > 20%), Prior T2D was not associated to presence of NAFLD. Across the 3 groups (S- vs M- vs no-NAFLD) there was a significant decrease of SC (357 ± 43 vs 339 ± 28 vs 201 ± 30 cm^2, p = 0.007), BMI (37 ± 2 vs 32 ± 2 vs 30 ± 1 kg/m^2; p = 0.04), ESR (38 ± 9 vs 19 ± 5 vs 12 ± 4 mm/h; p = 0.02), FLI (79 ± 7 vs 46 ± 10 vs 35 ± 8; p = 0.005). HTG was associated with BMI (r = 0.67), FLI (r = 0.74), ESR (r = 0.78) (for all p < 0.001), with SC, VF, cholesterol (CHOL), (for all p < 0.02), and with TG, C-reactive protein, insulin, platelets, WC (all p ≤ 0.05). No relationship between HTG and HDL-CHOL, AST, ALT, GGT, ferritin, fibrinogen and percent of weight loss or regain. The relationship between HTG and ESR was maintained after adjusting for BMI or FLI. In a multiple regression model, BMI, CHOL and ESR explained 86% of HTG variability (r = 0.93, p < 0.0001).
Conclusion Long after RYGB we recorded severe liver steatosis in 30% of subjects independently associated to FLI and high ESR. If confirmed by larger studies, both FLI and ESR could be used as a simple diagnostic marker of presence of NAFLD after bariatric surgery.

P4-11

DIFFERENTIAL EFFECT OF RYGB AND BPD ON PLASMA LEVELS OF ANGPTL3 AND ANGPTL4: ASSOCIATION WITH PARAMETERS OF GLUCOSE AND LIPID METABOLISM

S. Bini[1], M. Arca[1], M. Palumbo[2], L. Polito[1], I. Minicocci[1], V. Pecce[1], L. D'Erasmo[1], A. Di Costanzo[1], E. Ferrannini[2], S. Camastra[2]

[1]Dipartimento di Medicina Traslazionale e di Precisione, Policlinico Umberto I, Sapienza università di Roma Roma, [2]Dipartimento di Medicina Clnica e Sperimentale, Ospedale "Cisanello" di Pisa, Univesità degli studi di Pisa Pisa

Introduction ANGPTL3 and ANGPTL4 are regulators of lipolysis and participate in substrate disposal. Their role in glucose metabolism and the effect of bariatric surgery (BS) is not clear. Our aim was to study the differential effect of Roux-en-Y gastric bypass (RYGB) and biliopancreatic diversion (BPD) on serum ANGPTL3 and ANGPTL4 concentrations and their association with the changes in glucose and lipid metabolism observed after surgery.
Methods We studied patients undergoing RYGB (11 non-diabetic (NGT), 16 with type 2 diabetes (T2D)) or BPD (15 T2D) using the euglycemic hyperinsulinemic clamp before and 1 year after surgery. Serum ANGPTL3 and ANGPTL4 and parameters of lipid and glucose metabolism were measured.
Results Before surgery, no differences were observed between T2D and NGT for either ANGPTL3 or ANGPTL4 levels. After BS, BMI decreased and insulin sensitivity (M-value) increased (p < 0.001 for both) in RYGB and BPD alike. After BPD, serum ANGPTL3 levels rose from 225 ± 20 ng/ml to 300 ± 15 ng/ml (p = 0.003), whereas no change was observed after RYGB. Post-surgery, ANGPTL4 levels decreased from 26.6 ± 0.6 to 24.4 ± 0.3 ng/ml (p = 0.001 in both NGT and T2D) with RYGB, and from 27.9 ± 1.5 to 24.0 ± 0.5 ng/ml, (p = 0.003) with BPD. The M-value was directly related to ANGPTL3 and inversely related to ANGPTL4. In a multiple regression analysis of post-BPD data, the decrease in FFA (p = 0.008) and the increase in M-value (p = 0.04) were the principal determinants of the ANGPTL3 increase (p = 0.002 for the model). In RYGB patients, ANGPTL4 levels were independently associated with the M-value, body weight, and serum adipsin ($R^2 = 0.49$).
Discussion Circulating levels of ANGPTL4 are consistently reduced by either type of bariatric surgery in both NGT and T2D individuals,

and appear to be influenced by adipose mass and insulin sensitivity. Serum ANGPTL3 levels increase only after BPD as a function of adipose tissue and whole-body insulin sensitivity, suggesting a role for bile acids.

P5-1
FOOD ADDICTION ASSESSMENT IN A NON-CLINICAL SAMPLE OF THE ITALIAN POPULATION. A PILOT STUDY

A. M. Aloisi[1], E. Rostanzo[1]

[1]*Scuola di Specializzazione in Scienze dell'Alimentazione, Università di Siena Siena*

Objective Discussion about the potential addictive role of certain types of food and their link with obesity has recently increased. Researchers have developed instruments to specifically assess food addiction (FA). The aim of this pilot study was to investigate the prevalence of food addiction in a non-clinical sample of the Italian population.
Methods All participants (n = 148: 46 males, 102 females) completed the Yale Food Addiction Scale 2.0 (YFAS 2.0) and provided self-reported measures and demographic information. They were divided into three age groups.
Results The prevalence of FA was 15.5% of our sample (82.6% of the subjects diagnosed with FA were female). The FA symptoms mean was 1.90 (SD = 2.87). In both sexes, participants aged 18–30 had the highest diagnosis of FA, with 52.1% of all FA subjects being females aged 18–30. According to the Body Mass Index (BMI), all the males diagnosed with FA were overweight or obese, as were most (63.2%) of the FA females.
Conclusions Future food education policies could consider FA assessment together with that of other eating disorders, even among non-clinical subjects in order to anticipate diagnosis and improve treatment.

P5-2
THE TREATMENT OF OBESITY IN PATIENTS WITH BINGE-EATING DISORDER AND DYSFUNCTIONAL EATING

M. R. Ritacco[1], E. Lapini[1], G. Cesa[1], I. Del Gobbo[1], V. Zaccheroni[1]

[1]*Ospedali Privati forli'. Villa Igea Forli'*

Many studies show a link between eating disorder and traumatic events onset such as psychological, physical and sexual violence. This study evaluates the treatment of BED and obesity during a rehabilitative hospitalization regime, with particular attention to causes of the disorder. The study has examined whether the reduction of weight and the body mass index (BMI), the test for obesity-related disabilities (TSD-OC), and the Psychological General Well-Being Index questionnaire (PGWBI), after a metabolic rehabilitation, had a different trend in subjects affected by BED with or without traumatic events history, compared to subjects with dysfunctional nutrition.
Materials and methods 136 subjects (age 58 ± 12) with BMI at clinic access 48.8 ± 11 kg/m^2. The evaluation of the BED and the possible traumatic event was investigated by administration TSD-OC test and PGWBI questionnaire the day of admission (T0) and the day before discharge (T1).
Results Body weight's reduction was 8 ± 7.96 kg and BMI reduction was 3 ± 2.12 kg/m^2. 18% of the patients suffered a declared traumatic event and of these 68% developed BED (p < 0.05). TSD-OC test on all subjects showing an improvement in related obesity disabilities (T0 172 ± 81; T1 115 ± 79 points).
The PGWBI test passes from T0 67 ± 16 to T1 85 ± 12 with an improvement of 16.78%. Subjects with BED/trauma and BED

without trauma showed an improvement in the PGWBI TEST (20.24% and 20.87%, respectively).
Conclusions Intensive residential rehabilitation is effective for all subjects and does not hinder weight loss during the rehabilitation process. Our data on the link between BED and trauma are in line with those of the scientific literature.

P5-3
DECLUTTERING, BED, HOARDING DISORDER

G. L. Cesa[1], D. Battani[1], I. Del Gobbo[1], M. R. Ritacco[1], E. Lapini[1], A. Monti[1], V. Zaccheroni[1]

[1]*Ospedali Privati Forli'. Villa Igea Forli'*

As part of the rehabilitation treatment of the Obesity and Clinical Nutrition Center Private Hospital Forlì, an experimental project was activated which tests the use of decluttering, the removal of superfluous objects and accumulations; this project, the first in Italy, was realized in collaboration with Studio ArchiBenessere. The accumulations affect both the psychological state, creating states of anxiety, confusion, indecision, distraction and insecurity, and the practicality of the house, limiting the usability and freedom of movement, thus aggravating the situation of psychological distress. The aims of the study is evaluate the effectiveness of the meetings on decluttering and the correlation between BED and Accumulation Disorder.
Materials and methods 102 subjects of mean age 53.89 ± 10.99, mean weight 137.1 ± 36.23 kg and mean BMI 49.75 ± 11.82 kg/m^2, who were administered a battery of tests including Hoarding Rating Scale, PGWBI, BES, DBI, STAI in order to assess the correlation between BED and Hoarding Disorder. Patients participated in psychological groups where psychotherapists focus on emotional and psychological components while the experts focus on the technical part, providing a definition of decluttering and the causes that lead to accumulation, resistance to letting go of objects and solutions to overcome them. During the psychological follow-up interviews emerge that patients return home and begin to put into practice the techniques they have learned. 27.54% of subjects showed altered values in the questionnaires (PGWBI, BDI, BES, STAI) and 13.26% also in Hoarding, which is correlated with altered values in the other tests (p < 0.05). 20.6% of subjects exhibit BED accumulation and 13.39% exhibit dysfunctional nutrition and accumulation. There is a relationship between BED and dysfunctional eating and storage disorder (p < 0.05).
A strong link seems to emerge between the use of decluttering techniques, weight loss and greater psycho-emotional well-being.

P5-4
SENSORY PERCEPTION IN OBESE SUBJECTS WITH EATING DISORDERS: A MATTER OF TASTE?

E. Pagliarini[1], C. Cattaneo[1], S. Mambrini[2], L. Gilardini[3], V. Barbieri[4], S. Bertoli[3]

[1]*Sensory & Consumer Science Lab (SCSLab), Department of Food, Environmental and Nutritional Sciences (DeFENS), University of Milan Milan,* [2]*Istituto Auxologico Italiano, IRCCS, Laboratory of Metabolic Research, S. Giuseppe Hospital Piancavallo,* [3]*Obesity Unit, Laboratory of Nutrition and Obesity Research, Department of Endocrine and Metabolic Diseases, IRCCS Istituto Auxologico Italiano Milan,* [4]*Istituto Auxologico Italiano, IRCCS, Division of Nutritional Rehabilitation, S. Giuseppe Hospital Piancavallo*

Obesity is now considered a multifactorial disease, where various metabolic, functional and socio-environmental components contribute to its development. However, the emotional component and the

relationship with food remain an important component and the link between obesity and various eating disorders is becoming increasingly clear. The aetiology and maintenance of eating-disorder symptoms are not well understood. Since some evidence suggests that there may be gustatory alterations in this kind of patients, the aim of this work is to investigate taste perception in patients suffering from obesity diagnosed with eating disorders.

Methods The taste thresholds of sweet and salty were assessed in a sample of 85 subjects through an ISO13301:2018 methodology, i.e. 3-Alternative-Forced-Choice (3-AFC). A general index of bitter taste sensitivity was also measured through the responsiveness to 6-n-propylthiural (PROP).

Results Preliminary data showed that control subjects are characterized by a greater sensitivity for both sweet and salty taste while, in the obese group, subjects with eating disorders seem to present low sensitivity for salty taste. No significant differences were highlighted for PROP, probably due to the actually sample size dimension. Looking at the effect of gender, women seem to present lower thresholds (higher sensitivity) for sweet taste than men, independently of their nutritional status or presence of eating disorders.

Discussion Despite the preliminary nature of these data regarding interindividual differences in taste perception, these results will contribute to increase the knowledge on sensory perception's role in eating behavior. Moreover, this study could provide novel indications for a personalized dietary intervention effective for weight loss in obese patients affected by eating disorders.

P5-5

A PSYCHO-NUTRITIONAL APPROACH IMPROVES TYPE 2 DIABETES OUTCOMES IN PATIENTS WITH OBESITY AND DYSFUNCTIONAL EATING: THE EXPERIENCE OF "CENTRO DAI E OBESITÀ" OF CITTÀ DELLA PIEVE

L. Barana[1], G. Colleluori[2], M. T. Sulpizi[1], K. Ortenzi[3], L. Farano[3], C. G. Fanelli[1], R. Calafiore[1], L. Dalla Ragione[3], S. Pampanelli[3]

[1]Section of Endocrinology and Metabolism, Department of Medicine, University of Perugia Perugia, [2]Center for the Study of Obesity, Department of Experimental and Clinical Medicine, Marche Polytechnic University Ancona, [3]Centro DAI e Obesità of Città della Pieve, USL Umbria1 Città della Pieve (PG)

Introduction Dysfunctional eating (DE) is strongly associated with obesity and worsens type 2 diabetes (T2DM) outcomes. An intensive lifestyle intervention is mandatory in obesity and T2DM treatment, but evidence regarding the impact of a psycho-nutritional treatment specifically designed for DE on T2DM control lacks. The aim of this study was to investigate the impact of the psycho-nutritional approach performed at "Centro DAI e Obesità" of Città della Pieve on weight loss and glucose management in patients with severe obesity, T2DM and DE habits.

Methods The program consisted of psychotherapy, meal planning, physical, social and educational activities. Inpatient with severe obesity (BMI $\geq$ 35 kg/m^2), T2DM and DE habits who completed the 8 weeks residential treatment between 2010 and 2019 were included in the analyses. We assessed anthropometric variables, glucolipid panel, body composition (by bioimpedance) at baseline and at end of the program (EoP). Weight and HbA1c were also measured one year after EoP.

Results Sixty-nine patients completed the program. Patients reduced weight ($- 7 \pm 3\%$; $p < 0.001$), BMI ($- 7 \pm 3\%$; $p < 0.001$) and waist circumference ($- 5.3 \pm 2.7\%$; $p < 0.001$). Fat mass significantly decreased ($p < 0.001$) and muscle mass increased ($p = 0.016$) at EoP. A significant reduction in triglycerides and AST ($p < 0.001$ for both), GGT and ALT (p 0.008 for both) was detected and glycemic control improved (HbA1c from $7.9 \pm 1.8\%$ to $7.05 \pm 1.4\%$,

fasting glucose from 164 ± 59 to 135 ± 48 mg/dl, $p < 0.001$ for both) at EoP. Eleven% of subject requiring diabetes medications at baseline (n = 64) discontinued the therapy. In the insulin treated group (49% of patients), mean daily units were halved (from 66 ± 29 to 34 ± 25, $p < 0.001$). One year after EoP, benefits partially persisted: weight loss was $- 6 \pm 7.4\%$ ($p < 0.001$) and HbA1c was $0.52 \pm 1.4\%$ ($p = 0.029$) compared to baseline.

Conclusion Our intensive holistic psycho-nutritional approach is able to improve T2DM management in patients with obesity and DE.

P5-6

CALORIC INTAKE MISREPORTING IN SUBJECTS WITH OVERWEIGHT AND OBESITY: OUR EXPERIENCE

A. Piontini[1], F. Granata[2], M. R. Ingenito[1], C. Gribaudi[1], L. Vigna[1]

[1]Centro Obesità e Lavoro, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milano, [2]UO Medicina Generale, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milano

Background Diet is a modifiable behaviour that influence individual and public health. Therefore, the evaluation of people's eating habits, compared to daily energy intake reported (EIrep), is important in order to assess if their declarations are correct or incorrect (misreported).

Aim Evaluation, according to EFSA protocol (Appendix 8.2.1, 2013), the misreporting phenomenon in patients with overweight and obesity, with some of its determinants: BMI, age, gender, and education level.

Method 252 patients (71% w–29% m), age 19–74 years and BMI $\geq$ 25 were enrolled. The Goldberg Cut-off method was used to evaluate the adequacy of energy intake reported in food questionnaires and calculate misreporting classes. As food questionnaire was used Grana Padano Observatory (OGP free-online educational tool), and for physical activity assessment was used IPAQ-SF-International Physical Activity Questionnaire-Short Form. Data obtained from OGP (EIrep) end from IPAQ (PAL physical activity level) were used at individual level in Goldberg Eq. 1.

Results Average BMI 32 0.9 $\pm$ 5.4 kg/m^2, median 31.7; average age 53.2 $\pm$ 12.3 years, median 55.0. The percentage distribution of educational level: Elementary 5%, Lower Middle School 23%, High School 47%, Graduation 23%.

The distribution of EIrep in OGP was 28% underestimate, 63% normal estimate and 9% overestimate. The gender was shown to be a determinant of misreporting (in male sample: 45% underestimate vs 21%, normal estimate 69% vs 50%, overestimate 5% vs 10% in female one). Age and education level did not affect energy reporting. About BMI was found that subjects who underestimate have a higher BMI (32.9 kg/m^2) vs who correctly estimate (30.7 kg/m^2).

Conclusions The Goldberg cut-off method is a cost-effective method to asses misreporting phenomenon, however it could be more useful in a research setting than in clinical one due to the complexity of calculations required.

[1]Black, 2000a; 2000b European Journal of Clinical Nutrition.

P5-7

DEVELOPMENT OF A QUESTIONNAIRE ON NUTRITIONAL KNOWLEDGE FOR OBESE PATIENTS UNDERGOING RESIDENTIAL REHABILITATION

S. P. Mambrini[1], V. Calderoni[2], E. Averna[2], G. Di Guglielmo[2], E. Lucchetti[2], T. Tinozzi[2], C. Vinci[2], V. Barbieri[2], D. Soranna[3], A. Zambon[3], M. Scacchi[1]

[1]Istituto Auxologico Italiano, IRCCS, Laboratory of Metabolic Research, S. Giuseppe Hospital Piancavallo- Oggebbio, [2]Istituto Auxologico Italiano, IRCCS, Dietetics and clinical nutrition service, S.Giuseppe Hospital Piancavallo- Oggebbio, [3]Department of Statistics and Quantitative Methods, Milano-Bicocca University Milan

An important goal of multidisciplinary rehabilitation of obesity is represented by the improvement of patients' knowledge about nutrition. Thus, educational courses regarding correct food consumption exert a pivotal role in these rehabilitative programmes. Few tools are currently available for the assessment of the efficacy of such educational courses, in particular during residential rehabilitation of severely obese patients. The present study was aimed at building and validating a questionnaire able to assess dietary knowledge in obese subjects.

Methods A pool of experts carried out a review of the literature, gathering all the information necessary to select and construct the best set of questions and the final format of the questionnaire (phase 1). Validity, reproducibility and stability of the questionnaire were investigated in 350 obese patients undergoing residential rehabilitation, and in 300 students from Schools of Nutrition and Psychology.

Results Phase 1 analysis showed that 5 of the 56 questions originally conceived were not adequately discriminating and were consequently deleted from the final version (phase 2). Phase 3A showed a good correlation between the experimental questionnaire and another one considered as the gold standard in this field (R − 0.65), as proof of satisfactory reliability. Phase 3B showed that the difference between the mean scores obtained in two different administrations varied by 1.3 points with a sample correlation of 0.81, as evidence of satisfactory reproducibility. In phase 3C Nutrition students obtained significantly better scores than Psychology students, as proof of satisfactory validity.

Conclusion The new questionnaire has all the characteristics to be considered a valid tool for investigating dietary knowledge in the obese population. The psychometric tests confirmed a good internal consistency of the structure, validity of the content, good reproducibility and stability over time.

P5-8

SELF-MONITORING PHYSICAL ACTIVITY IMPROVES SELF-EMPOWERMENT IN PATIENTS WITH OBESITY: A PILOT STUDY

G. Bernardelli [1], R. Kolleshi[2], E. Marchiori [2], G. Gambino[2], V. Di Gennaro Colonna[1], L. Vigna[2]

[1]Dipartimento di Scienze Cliniche e di Comunita' Universita' Degli Studi di Milano Milano, [2]Centro Obesità e Lavoro, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico Milano

A moderate physical activity (PA) of at least 60–90 min is required to prevent regaining lost weight, and at least 150 min a week are required for long-term weight control. It is likely that large populations choose to accept increased lifestyle activity rather than more structured exercise training.

Table 1 Comparison of the main outcomes at T0 vs T1 in PwO

	Baseline n = 41	T1 n = 41	p-value*
Weight (kg)	88.67 (17.30)	85.46 (17.06)	< 0.001
SF36 Physical functioning	75.85 (19.49)	83.05 (12.74)	< 0.001
Leisure activities (min/ week)	87.32 (117.44)	188.54 (80.42)	< 0.001
6 MWT (meters)	456.76 (75.00)	499.02 (55.52)	< 0.001

*p-value obtained by Student's T-test for paired samples

Aim To evaluate the effects of a self-monitoring PA protocol and diet in patients with obesity (PwO) to encourage PA and improve health status.

Materials and methods At enrolment and after 2 months, 41 PwO (14F 27 M, mean: age 53 years, BMI 32.7) were submitted to: antropometry, Six-minute walking test (6MWT), Short Form-36 (SF-36) and Global Physical Activity Questionnaires (GPAQ). They received personalized diet and PA diary, with a monthly custom goal and a daily diary where was asked to identify activities he accomplishes each day and for each of them to crosses a square. Each square corresponds to one minute of PA. The patient must try to mark all the squares throughout the day, for at least 5 times a week for a maximum of 30 min.

Results are showed in Table 1

Conclusions Self-monitoring PA helps people keep track of their current behavior and performance and is associated with weight loss. PA diaries are often feasible and can also provide information about the type of activity, intensity, and time dedicated. It is fundamental to identify suitable models for the correct type and the right amount of PA as well as encouraging their practice in PwO.

P5-9

IS QUALITY OF MOVEMENT OBSERVED WHEN PRESCRIBING EXERCISE WITH OBESE PATIENTS? A PILOT STUDY

L. Cavaggioni[1], L. Gilardini[1], G. Redaelli[1], M. Croci[1], P. Capodaglio[2], M. Gobbi[2], S. Bertoli[1]

[1]Obesity Unit and Laboratory of Nutrition and Obesity Research, Department of Endocrine and Metabolic Diseases, IRCCS Istituto Auxologico Italiano Milano, [2]Rehabilitation Unit and Research Laboratory in Biomechanics and Rehabilitation, Istituto Auxologico Italiano IRCCS, San Giuseppe Hospital Verbania

Introduction Being physically fit may display a valuable role in the development of wellbeing and within the parameters connected with the decrease of physical activity, obesity is one of them. Obesity is also associated with a reduced postural control and functional performance. To improve physical fitness international guidelines suggests to perform 150 min of physical activity combined with resistance training. The aforementioned guidelines mainly focuses on quantity of exercise with little regards to the quality of movement. The aim of this study was to evaluate the effects of a six week period of movement quality training intervention on functional parameters in obese individuals.

Methods Sixty-four obese patients (55.9 ± 10.6 years, 99.5 ± 12.3 kg, 37.5 ± 4 kg/m^2) were recruited at the IRCCS Istituto Auxologico Italiano and randomly assigned into two home-based interventions. In the movement-quality group (MQ) individuals

performed a training program based on whole-body patterns emphasizing mobility, motor control and diaphragmatic breathing. The conventional-training group (CT) executed common strength body-weight exercises. Both interventions lasted 45 min for three days a week. Functional Movement Screen (FMS[TM]), Modified Balance Error Scoring System (M-BESS) and Body Mass Index (BMI) were evaluated before and after the intervention. A mixed analysis of variance was used to determine any significant interactions and main effects of time and groups.

Results Significant interactions and main effects of time in FMS[TM] and M-BESS scores ($p < 0.05$) were detected in favor of MQ compared to CT, while only a main effect of time in BMI parameter was highlighted in both groups.

Conclusion Given the results of this study, movement quality exercises focused on mobility and motor control are more effective in improving functional movement performance in obese individuals compared to traditional strength exercises.

P5-10
PHYSICAL ACTIVITY AND FEMALE SEXUAL DYSFUNCTION: A LOT HELPS, BUT NOT TOO MUCH

E. Maseroli[1], G. Rastrelli[2], V. Di Stasi[2], S. Cipriani[2], I. Scavello[2], T. Todisco[2], V. Gironi[3], G. Castellini[3], V. Ricca[3], F. Sorbi[4], M. Fambrini[4], F. Petraglia[4], M. Maggi[2], L. Vignozzi[2]

[1]Andrologia, Endocrinologia Femminile e Incongruenza di Genere, Azienda Ospedaliero-Universitaria Careggi Firenze, [2]Dipartimento di Scienze Biomediche, Sperimentali e Cliniche "Mario Serio", Università di Firenze Firenze, [3]Unità di Psichiatria, Dipartimento di Neuroscienze, Psicologia, Area del Farmaco e Salute del Bambino Firenze, [4]Unità di Ginecologia, Dipartimento di Scienze Biomediche, Sperimentali e Cliniche "Mario Serio", Università di Firenze Firenze

Background and aim Research on the relationship between physical activity (PA) and female sexual dysfunction (FSD) is lacking. Our aim was to investigate the clinical, psychological, and sexual correlates of PA in women with FSD.

Methods A non-selected series of n = 322 pre- and post-menopausal patients consulting for FSD was retrospectively studied. Regular involvement in PA and its frequency (< 1 h/week: sedentary, 1–3 h/week: active, 4–6 h/week: very active, > 6 h/week: extremely active) were investigated with a specific question. FSDs, including HSDD (Hypoactive sexual desire disorder) and FGAD (Female genital arousal disorder), were diagnosed according to a structured clinical interview. Participants underwent a physical examination and a clitoral Doppler ultrasound, and were asked to complete the Female Sexual Function Index, Female Sexual Distress Scale-Revised, Body Uneasiness Test, and Middlesex Hospital Questionnaire.

Results At multivariate analysis, women engaging in PA (67.4%, n = 217) scored significantly higher in several FSFI domains—including desire, arousal and lubrication—and showed lower sexual distress and lower resistance of clitoral arteries vs. sedentary women. An inverse association between PA and HSDD was observed. Mediation analysis demonstrated that the negative association between PA and HSDD was partly mediated by body image concerns, psychopathological symptoms and sexual distress. These latter two factors also partly mediated the association between PA and a reduced risk of FGAD, whilst a lower BMI was a full mediator in the relationship between PA and FGAD. Finally, extreme PA was associated with significantly worse scores in several psychosexual parameters (i.e. sexual satisfaction), even compared to a sedentary lifestyle.

Conclusion In women with FSD, PA was associated with better sexual function and clitoral vascularization, lower sexual distress and reduced odds of HSDD and FGAD; the benefits of PA on sexuality were mediated by both psychological and organic determinants; excessive PA was related with a poor overall sexual function and with a low sexual satisfaction. Therefore, women consulting for FSD may gain benefits on sexuality from regular PA; however, physicians should remain alert to the downsides of excessive exercise.

P5-11
A SURVEY ON THE PERCEPTION OF TELEMEDICINE IN WEIGHT MANAGEMENT IN PATIENTS WITH OBESITY

L. Gilardini[1], R. Cancello[1], M. Croci[1], A. Bruno[1], L. Cavaggioni[1], G. Castelnuovo[2], S. Mambrini[3], S. Bertoli[1]

[1]Obesity Unit-Laboratory of Nutrition and Obesity Research, Department of Endocrine and Metabolic Diseases, IRCCS Istituto Auxologico Italiano Milano, [2]Clinical Psychology Lab, IRCCS Istituto Auxologico Italiano Milano, [3]Division of Nutritional Rehabilitation, IRCCS Istituto Auxologico Italiano Piancavallo

The COVID-19 pandemic has compromised access to multidisciplinary lifestyle interventions and outpatient follow-up for obese subjects. There is evidence that remotely delivered lifestyle interventions can be as effective as in-person visits for weight management. We posted a questionnaire of 34 questions on Istituto Auxologico Italiano newsletter from September 2020 to March 2021 in order to investigate how obese patients perceive the use of telemedicine in the management of obesity and which are the major critical issues. 461 subjects completed the questionnaire (10% males, mean age 49.9 ± 11.8 years, mean BMI 36.6 ± 6.7 kg/m^2). During outbreak, a third of subjects stopped nutritional counselling for weight management and 10% psychological support. About 80% of subjects would like to start or continue a multidisciplinary obesity care via telemedicine. Technological support does not appear to be a critical issue, as 95% of respondents own at least one smartphone. About 70% of subjects would have no problem having psychological video consultations, preferably once a week. The majority of patients are prone for online nutritional consultations. The preferred method is the individual contact once a week, followed by a group activity. Only 23% attended online physical activity courses during lockdown, but 70% are willing to start. Laziness and lack of proper space at home would be the biggest deterrent. Patients believe that the cost of telemedicine should be provided by the national health system, however they would be willing to do them at a moderate cost. In general, most would prefer to have video consultations with already known health professionals.

In conclusion the study shows that patient with obesity are in favour of changing access to health-care outside of traditional, in-person hospital visits. Telemedicine could be a powerful way to deliver comprehensive and effective obesity care after the management of major critical issues, such as costs and familiarity with the operators.

P6-1
THE IMPACT OF OBESITY ON MUSCLE QUALITY: GENDER DIFFERENCES

M. S. Lonardo[1], N. Cacciapuoti[1], M. S. Di Lauro[1], M. Chiurazzi[1], F. De Giovanni Di Santaseverina[1], N. Serao[1], R. Di Martino[1], B. Guida[1]

[1]Department of Clinical Medicine and Surgery, Physiology Nutrition Unit, "Federico II" University of Naples, 80131 Naples, Italy NAPOLI

Introduction Muscle strength may be impaired in obese people. Nowadays there are few evidences about the effect of obesity on muscle quality (MQ).

Objective We investigated if there were any differences in muscle mass, handgrip strength (HG) and MQ (muscle strength corrected for muscle mass) among normal-weight [(NW)body mass index (BMI, kg/m^2) < 24.9)], overweight (OW) (BMI:25 to 29.9), obese I (OI) (BMI:30 to 34.9) and obese II (OII) (BMI ≥ 35) young adults.

Design The cross-sectional study included 156 subjects [(30 NW; 25 F; age: 30.7 ± 10.5 years; BMI: 21.6 ± 2.4), (44 OW; 37 F; age: 39.8 ± 11.1 years; BMI 27.6 ± 1.4) (38 OI; 25 F; age: 38.4 ± 10.1 years; BMI: 32.8 ± 1.3), (44 OII; 30 F; age: 40.4 ± 12.5 years; BMI: 40.8 ± 4.0). Anthropometric measurements, measures of skeletal muscle mass (kg) by Bioelectrical Impedance Analysis (BIA) adjusted for height (SMI) and HG by dynamometer were collected.

Results In men (M) were observed higher values of SMI (M 13.2 ± 1.5; F 11.2 ± 1.2; P < 0.001), MQ (M 0.9 ± 0.2; F 0.8 ± 0.2; P < 0.001) and HG (M 38.1 ± 7.4; F 24.3 ± 5.8; P < 0.001) than in women (F). SMI increases significantly both in M and F with increasing of BMI (P < 0.001); while absolute (unadjusted) HG did not differ significantly among NW, OW, OI and OII either in M than F. When HG was adjusted for skeletal muscle mass, MQ differs significantly among NW, OW, OI and OII women (0.98 ± 0.1; 0.87 ± 0.2; 0.79 ± 0.2; 0.75 ± 0.2; P < 0.001), while no significant differences were observed in M. Stratyfing by Waist circumference/h tertiles, we observed a decrease of MQ in the highest tertile (P < 0.005) in M, whereas in F there is a progressive decrease both of MQ (P < 0.001); and HG (P < 0.002) in intermediate and highest tertile.

Conclusion Young M adults had a greater muscle mass, HG and MQ than young F adults. In F, obesity is associated with decreased MQ and visceral obesity determines a early impairment of it. Currently mechanisms are unknown, but would be interesting to evaluate the hormonal role in future research.

P6-2
METABOLIC-FUNCTIONAL EFFECTS OF PD-E07 SUPPLEMENTATION IN PATIENTS WITH SARCOPENIC OBESITY

M. Gobbi[1], A. Brunani[1], R. Cancello[2], E. Lucchetti[1], P. Piterà[1], S. Maestrini[1], A. Milesi[1], P. Capodaglio[1], E. Nisoli[3]

[1]Istituto Auxologico Italiano, Ospedale San Giuseppe Piancavallo (VB), [2]Obesity Unit, Laboratory of Nutrition and Obesity Research, Department of Endocrine and Metabolic Diseases Milano, [3]Center for Study and Research on Obesity, Department of Biomedical Technology and Translational Medicine, University of Milan Milano

Introduction The best approach to treating Sarcopenic Obesity (SO) is the combination of a low-calorie balanced diet and structured physical activity aimed at recovering muscular mass (MM). Supplementation with amino acids and vitamins could contribute to the maintenance of MM.

Methods Inpatients men subjects (n = 33), age 40–60 years, mean BMI (± SD) 45.4 ± 8.5 kg/m^2, with SO (MM ≤ 35.6%, handgrip dx 42.5 ± 6.7 kg) were recruited in a 4-week rehabilitation treatment associated (PD-E07 group) or not (CRT group) with a new formula of essential amino acids (EAA) and intermediates of the tricarboxylic acid cycle (TCA cycle) (PD-E07, Aminother®) to evaluate the effects on biochemical profile, weight loss, body composition, physical performance, and muscle strength. Differences between baseline and the end of the treatment were analyzed with appropriate statistics.

Results In both groups, weight loss was 5% of the initial weight, without significant differences. A trend for an increased MM occurred only in the PD-E07 group (+ 5% vs − 2%, ns). Improved gluco-lipid metabolic profile was observed in both groups, with higher significant difference in the PD-E07 group (basal glucose, − 9% vs − 8%, p = 0.0005; low density lipoprotein-cholesterol, − 23% vs − 7.9%, p = 0.004; triglycerides, − 21% vs − 18%, p = 0.002). We observed a significantly increased respiratory quotient (RQ), measured with indirect calorimetry, only in the PD-E07 group (0.78 ± 0.05 to 0.80 ± 0.01, p = 0.05). The average 6MWT, trended better in the PD-E07 than the CRT group (+ 10% vs + 8%, ns).

Conclusions The multidisciplinary rehabilitation treatment effectively improved biochemical indicators of the metabolic state, RQ, body composition, and physical performance in SO. The administration of a new EAA-TCA intermediate mixture has beneficial effects on energy metabolism and physical performance. Clinical trials with a higher number of patients and a longer duration could conclusively confirm and strengthen this suggestion.

P6-3
RELATIONSHIP BETWEEN GLUCOSE METABOLISM, BODY COMPOSITION, AND INFLAMMATORY PATTERN IN ELDERLY SUBJECTS

B. Russo[1], F. Picconi[1], M. Menduni[1], S. Frontoni[1]

[1]Unità di Endocrinologia, Diabetologia e Malattie Metaboliche, Ospedale S.Giovanni Calibita Fatebenefratelli. Dipartimento di Medicina dei Sistemi, Università di Roma Tor Vergata, Roma, Italia. Roma

Objectives Alterations in glucose metabolism and body composition are closely related and associated with a chronic inflammation state. The aim of the study was to evaluate the relationship between glucose metabolism, fat and muscle mass and distribution, and inflammatory pattern in elderly subjects with or without sarcopenia and type 2 diabetes mellitus (DM2).

Methods 39 DM2 elderlies (> 70 years and HbA1c < 8.5%) and 25 elderlies without DM2 were enrolled. All subjects were divided into four groups: 15 healthy elderlies (HE); 20 with DM2 (DM); 10 with sarcopenia (SA); 19 with both DM2 and sarcopenia (DS). Glucose metabolism, body composition and inflammatory status were evaluated in all groups. Appendicular lean mass index (ALMI), fat mass index (FMI), ALMI relative to fat mass (ALMI$_{FMI}$), %fat trunk/%fat legs ratio were calculated. A mixed meal tolerance test was used to assess insulin sensitivity and secretion indexes.

Results Fat trunk%/fat legs% were significantly increased in the DM compared to the HE and SA (p < 0.05). No significant difference in ALMI between HE and DM group and between SA and DS group was found. However, ALMI$_{FMI}$ was significantly reduced in DS compared to the other groups (p < 0.001). A progressive reduction of isrb@-gre2-t was observed, with the highest value for the HE group, followed by SA, DM and DS. A negative correlation was observed between fat trunk%/fat legs% and glucose sensitivity index in diabetic groups (r = − 0.47, p < 0.05). The GDF-15 plasma levels resulted increased in DM and DS compared to HE and SA (p < 0.008) and a negative correlation between GDF-15 and isrb@gre2-t was observed (r = − 0.36, p = 0.04). A negative correlation was also observed between TNF-α and ALMI$_{FMI}$ in diabetic groups (r = − 0.47, p = 0.04).

Conclusions In this elderly population the body fat distribution significantly impacts on glucose sensitivity, while sarcopenia has a weak effect only on insulin secretion. In addition, the inflammatory status impacts beta cells function and body composition in DM2 elderlies.

P6-4

VITAMIN D: A POTENTIAL DETERMINANT OF
CHRONOTYPE IN SEVERE OBESITY?

L. Barrea[1], G. Pugliese[2], D. Laudisio[2], S. Savastano[2], A. Colao[2],
G. Muscogiuri[2]

[1]Università Pegaso Napoli, [2]Medicina Clinica e Chirurgia Napoli

Chronotype (CT) is the attitude of a subject to carry out their activities at a specific stage of the day in accordance with their biological rhythms. There are three CT categories: morning CT (MC) prefers activities earlier in the day, while evening CT (EC) prefers to time peak activity during the late afternoon or evening. Intermediate CT (IC) is in an intermediate position between MC and EC. EC has been associated to an increased risk of developing type 2 diabetes (T2DM) and cardiovascular diseases (CVD) in obesity. However, it is still unknown what are the determinants of CT categories in obesity. Since vitamin D is often low in obesity, it is produced after sun exposure thus probably playing a role in the light–dark cycle, we aimed to investigate if it could have a role in determining CT.

This cross-sectional study included 67 subjects with severe obesity (22.3% males; 38.1 ± 12.3 years; BMI 46.2 ± 6.8 kg/m^2). Anthropometric parameters, 25(OH) vitamin D levels (25OHD) and CT were assessed. CT was assessed by the Morningness–Eveningness Questionnaire (MEQ). Based on their scores, individuals were categorized as MC (59–86), IC (42–58) or EC (16–41).

CT was classified as MC in 27% of subjects, EC in 32% and IC in 41%. Our results demonstrated that individuals with EC, when compared to IC and MC had significant higher BMI values ($p < 0.001$) and lower 25OHD ($p < 0.001$). Individuals with IC had significant lower 25OHD than MC ($p < 0.001$). CT score negatively correlated with BMI (r = − 0.63; $p < 0.01$) and positively with 25(OH) vitamin D levels (r = 0.87; $p < 0.001$). Multivariate analysis using CT score as dependent variable and 25OHD, BMI, age as independent variables found that 25OHD were found to be the most powerful predictor of CT score ($p < 0.01$). Our study suggested that low 25OHD which is a common finding in obesity could contribute in determining EC and its related increased risk of developing T2DM and CVD in obesity.

P6-5

VITAMIN D DEFICIENCY IN OBESITY: THE IMPACT OF AN
ORAL SUPPLEMENTATION OF CHOLECALCIFEROL VS
CALCIFEDIOL ON PLASMA VITAMIN D LEVELS IN OBESE
WOMEN CANDIDATE FOR BARIATRIC SURGERY

M. Chiurazzi[1], C. Imparato[1], N. Cacciapuoti[1], M. S. Lonardo[1], F. De
Giovanni Di Santaseverina[1], E. Salomone[1], N. Serao[1], G. Esposito[1],
A. Belfiore[1], B. Guida[1]

[1]Department of Clinical Medicine and Surgery, Physiology Nutrition
Unit, "Federico II", University of Naples, 80131 Naples, Italy.
Napoli

Background Vitamin D (VD) is an important micronutrient for the maintenance of bone tissue and the homeostasis of calcium and phosphorus. Studies have confirmed a link between VD and obesity. Obesity is defined as excessive fat accumulation that may affect health. Currently Bariatric surgery (BS) seems to be the most effective treatment for severe obesity; nevertheless, these surgeries can cause nutritional deficiencies including VD. Some studies, showed that patients with a VD deficiency formerly BS and not treated with a vitamin D supplementation showed a worsening in serum VD levels after surgery.

Aim We investigated the impact of an oral supplementation of cholecalciferol vs calcifediol on plasma VD levels in obese women with VD deficiency, candidate for bariatric surgery.

Design Twenty-two obese women (Body Mass Index $\geq$ 30 kg/m^2) with serum levels of 25(OH)D < 30 ng/ml attending at Outpatients Clinic of the Departmental program "Diet therapy in transplantation and chronic renal failure", School of Medicine, "Federico II" University of Naples, were recruited, randomized into 2 groups and treated for 3 months. The first group was treated with a supplementation of cholecalciferol (A group); the second one was treated with calcifediol (B group). Anthropometric measurements and body composition assessed by Bioelectrical Impedance Analysis were detected at baseline and after 3 months; moreover, 25(OH)D serum levels were evaluated in both groups.

Results After 3 months of supplementation, the patients of both groups showed a significant improvement of plasma VD levels compared to baseline. Furthermore, B group showed higher 25(OH)D serum levels (35.8 ± 6.1* vs 18.2 ± 5.7; $p < 0.0001$) compared to A group (25.9 ± 6.9* vs 18.3 ± 7.1; $p = 0.02$).

Conclusion Our results demonstrates that a supplementation with calcifediol is more effective to reach adequate 25(OH)D levels in obese women candidate for bariatric surgery than a supplementation with cholecalciferol.

P6-6

EFFECTS OF VITAMIN B12 SUPPLEMENTATION IN
PATIENTS WITH VITAMINE B12 DEFICIENCY

D. Dellepiane[1], F. Muratori[2], D. Ojeda Mercado[1]

[1]Dietologia e Nutrizione Clinica Ospedale Koelliker Torino, [2]U.O.C.
Di Endocrinologia, Diabetologia e Nutrizione Clinica Ospedale
Sant'Anna Como Como

Introduction Vitamin B12 deficiency affects different systems of the human body. It has been proved how crucial it is to detect vitamin B12 deficiency in order to be able to act in time

objectives The purpose of this study is to evaluate the progressive deficiency status of vitamin B12 and the response to a sublingual treatment with a dosage of 1000 mcg and 5000 mcg

Methods The study, still in progress, involved five Italian centers with 134 subjects enrolled. From the moment of enrollment (T0), in which various haematochemical parameters were detected including serum vitamin B12, as well as weight, BMI and any ongoing drug therapy, patients began treatment with sublingual vitamin B12 administered once per week until the deficiency was solved out, defining a deficiency status with serum levels of vitamin B12 below 400 pmol/L

Results The enrolled patients were all vitamin B12 deficient: 29.7% (27 patients) had severe insufficiency, with a mean serum vitamin B12 of 155 pmol/L [69 pmol/L—197 pmol/L]; while 69.3% had a moderate deficiency between 208 pmol/L and 559 pmol/L, with an average of 291 pmol/L.

Conclusions 86.8% of patients are overweight/obese. These data suggest the hypothesis of a correlation between body weight, eating habits and the deficiency of vitamin B12 which in 23.1% of patients in overweight/obese has severe deficiency; The three patients who used contraceptive pills were all found to have severe vitamin B12 deficiency; in fact, in literature there are evidences that correlate the use of oral contraception with the deficiency of vitamins, including vitamin B12. The data which emerges from this study can confirm what literature mentions. High homocysteine was found to be the most reflective of a vitamin B12 deficiency

P6-7

RELATIONSHIP BETWEEN HOMOCYSTEINE, URIC ACID AND METABOLIC SYNDROME IN 1141 PATIENTS WITH OBESITY

F. Gori[1], M. R. Ingenito[2], E. Marchiori[2], G. Gambino[2], F. Gambino[3], A. Piontini[4], V. De Gennaro Colonna[5], L. Vigna[6]

[1]Dipartimento di Anestesia, Rianimazione e Emergenza Urgenza, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico MIlano, [2]Unità di Medicina del Lavoro, Centro per l'obesità e Centri di Collaborazione EASO per la gestione dell'obesità, Fondazione Ca' Granda Ospedale Maggiore Policlinico MIlano, [3]Laboratorio di Chimica Clinica e MIcrobiologia, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico MIlano, [4]Unità di Medicina del Lavoro, Centro per l'obesità e Centri di Collaborazione EASO per la gestione dell'obesità, Fondazione Ca' Granda Ospedale Maggiore Policlinico, Dipartimento di Medicina Trasfusionale e Ematologia, Ospedale Maggiore Policlinico MIlano, [5]Unità di Medicina del Lavoro, Centro per l'obesità e Centri di Collaborazione EASO per la gestione dell'obesità, Fondazione Ca' Granda Ospedale Maggiore Policlinico, Dip di Scienze Cliniche e di Comunità DISSCO, Università di MIlano MIlano, [6]Unità di Medicina del Lavoro, Centro per l'obesità e Centri di Collaborazione EASO per la gestione dell'obesità, Fondazione Ca' Granda Ospedale Maggiore Policlinico Milano

Background Homocysteine (HCys) and uric acid (UA) are both involved in cardiovascular disease, but elevated UA levels are not considered markers of cardiovascular risk (CVR). Patients with obesity (BMI > 30 kg/m^2, PwO) are characterized by elevated CVR. *Aim* to evaluate the relationship between HCys and UA in 1141 overweight and with obesity patients with and without metabolic syndrome (MS).
Methods Anthropometric data and blood pressure were recorded. Biochemical data were collected with routine methods on fasting blood sample. Comparisons based on gender, BMI (BMI 25–30 vs BMI > 30 kg/m^2) and presence of MS, as well as a sub-analysis in the group with BMI > 30 kg/m^2 divided by presence of MS, were performed. PwO with hyperuricemia (HUA) and hyperhomocysteinemia (HHCys), with and without MS, were distinguished. MS was defined according to the criteria of IDF (2005). Spearman correlation and multiple regression analysis were performed.
Results Gender, obesity and MS influenced both UA and HCys concentrations. Males, MS patients, PwO and PwO with MS had significantly elevated levels of both parameters. A positive correlation was found between HCys and UA (p < 0.001) in all subgroups. PwO with MS, HUA and HHCys, compared to PwO with HUA, HHCys but without MS, were characterized by hypertension (77% vs 0%, p < 0.001). Although a correlation between UA and systolic and diastolic blood pressure was found only in females and PwO (p < 0.05), a correlation between UA and HDL and triglycerides was found in all subgroups analyzed (p < 0.05). Multivariate analysis showed that HCys is an independent determinant factor affecting UA levels (T value 3.5, p < 0.001).
Conclusions HCys and UA were correlated in PwO, especially those with MS. The strong correlation between UA and hypertension, triglycerides and HDL suggests that the monitoring of UA concentration, together with HCys, is important in the diagnosis of CVR and could be included as CVR marker in PwO with and without MS.

P6-8

TESTOSTERONE LEVELS AND QTC INTERVAL IN OBESE PATIENTS WITH AND WITHOUT HYPOGONADISM

N. Benenati[1], A. Bufano[1], C. Ciuoli[1], N. Fralassi[1], A. Cartocci[2], M. G. Castagna[1]

[1]Department of Medical, Surgical and Neurological Sciences, University of Siena, Siena, Italy Siena, [2]Department of Medical Biotechnologies, University of Siena, Siena, Italy Siena

Background and aim QTc prolongation is a known cardiovascular risk factor. Obesity and related comorbidities are reported to be risk factors for QTc prolongation. Male hypogonadism, regardless of etiology, is also associated with QTc prolongation. Obesity and low testosterone levels often coexist and influence each other. The aim of this study was to evaluate if the simultaneous presence of hypogonadism and obesity may represent an additional risk factor for QTc prolongation in morbidly obese patients.
Patients and methods We retrospectively evaluated a population of 65 males with a mean age of 46.7 ± 11.7 years, followed for severe obesity. All patients underwent anthropometric and metabolic assessment, hormone measurement and screening for obesity-related complications. QT was measured by 12-lead ECG, then corrected for heart rate by applying the Bazett's formula.
Results The mean BMI was 46.01 ± 7.7 kg/m^2 and 80% of patients had morbid obesity (52 patients out of 65). Arterial hypertension was present in 72.3% of the patients (47/65), diabetes mellitus in 35.4% (23/65), fatty liver disease in 91.5% (54/59), obstructive sleep apnea syndrome (OSAS) in 94% (47/49) of the cases. The mean value of total testosterone was 2.4 ng/ml (range 0.7–4.7 ng/ml). Hypogonadism (total testosterone < 2.64 ng/ml) was observed in 73.8% patients (48/65). Mean QTc values were 451.3 ± 29.9 ms (median 451.0 ms) and QTc prolongation > 440 ms was observed in 57% (37/65) of subjects.
We performed a multiple linear regression analysis. Metabolic syndrome, testosterone levels, ECG alterations and hypogonadism were independently associated with QTc prolongation (r-square 0.347).
Conclusions In morbid obese patients hypogonadism seems to be an additional risk factor for QTc prolongation which is inversely related to testosterone levels. Therefore, in obese patients the presence of hypogonadism and its severity, should be evaluated in order to assess the cardiovascular risk of patients. However, our data need to be validated on a larger series of cases.

P6-9

"OXYTOCIN-RESISTANCE": AN EMERGING CONDITION FOR METABOLIC DERANGEMENT? A CROSS SECTIONAL STUDY AMONG PATIENTS WITH OBESITY AND NORMAL WEIGHT SUBJECTS

R. Tozzi[1], R. Rossetti[2], D. Masi[2], A. Caputi[2], R. Risi[2], A. Balena[2], M. E. Spoltore[2], E. Gangitano[2], M. Watanabe[2], S. Mariani[2], L. Gnessi[2], C. Lubrano[2]

[1]Dipartimento di Medicina Molecolare, "Sapienza" Università di Roma, [2]Dipartimento di Medicina Sperimentale, "Sapienza" Università di Roma

Background and aim of the study Oxytocin (OT), a neurohypophyseal peptide hormone whose best-known functions are to regulate lactation and uterine contraction during childbirth, demonstrated to be extensively implicated in the regulation of feeding behaviour, body weight and diabetes development. Intranasal administration of OT led to significant weight loss and increased pancreatic β-cell responsivity We aimed to evaluate plasma OT concentrations in relation to weight, adipose tissue distribution and cardio- metabolic risk parameters in a

population of patients with obesity or overweight compared to subjects with normal weight (NW).

Materials and methods We conducted an observational, cross-sectional study at the Department of Experimental Medicine, Section of Food Science and Endocrinology, "Sapienza" University of Rome. All subjects underwent clinical evaluation, biochemical routine assessment, body composition through Dual X-ray Absorptiometry (DXA) scan, and venous blood sampling in EDTA plus 500 KIU/ml of aprotinin for plasma OT determination through a commercially available ELISA assay

Results 151 patients (35 M and 116 F) were enrolled, with a mean age of 43.69 ± 15.67 years and a mean BMI of 32.51 ± 8.82 kg/m^2, stratified according to BMI (108/151 obese and overweight) and to the presence of metabolic syndrome (MS, 51/151 patients). OT was higher in those with obesity/overweight (923.420 ± 536.923 pg/ml vs 644.718 ± 228.2985 pg/ml, $p < 0.01$) and in patients with MS (1041.268 ± 575.828 pg/ml vs 745.265 ± 378.624 pg/ml, $p < 0.005$) compared to NW and non-MS subjects. Furthermore, OT levels were positively correlated with fat mass ($r = 0.24$, $p < 0.005$), waist circumference ($r = 0.26$ $p < 0.005$), HOMA-IR ($r = 0.36$ $p < 0.001$), and visceral fat deposition ($r = 0.48$, $p < 0.001$), the latter being more strongly associated with circulating OT levels compared to BMI, age, and sex ($r = 0.474$, $p < 0.001$)

Conclusions Circulating OT levels were unexpectedly higher in patients with obesity/overweight or with metabolic syndrome. Given the cardioprotective, anti-inflammatory and anorectic physiologic role of OT, the increase in plasma concentrations could be explained as an attempt to face visceral fat-induced complications within a state of "oxytocin-resistance" observed in obesity.

P6-10

IGF1-SDS IN METABOLICALLY HEALTHY AND UNHEALTHY PATIENTS WITH OBESITY: A CROSS-SECTIONAL STUDY IN 2032 SUBJECTS

R. Risi[1], D. Masi[1], A. Balena[1], A. Caputi[1], R. Tozzi[1], M. E. Spoltore[1], R. Rossetti[1], E. Gangitano[1], M. Watanabe[1], S. Mariani[1], L. Gnessi[1], C. Lubrano[1]

[1]Dipartimento di Medicina Sperimentale, V Clinica Medica, Policlinico Umberto I Roma

Background Metabolically unhealthy obesity (MUO) is associated with higher mortality, and the key players predicting its development among patients with obesity are still unclear. In individuals with normal weight and those with obesity, lower Insulin-like Growth Factor 1 (IGF-1) levels are associated with metabolic impairment. However, circulating IGF-1 interpretation is limited by its strong variability with gender and age.

Aim To calculate a surrogate marker of IGF1 serum concentration normalized by age and gender, expressed as IGF1 standard deviation score (IGF1-SDS), in a cohort of 2032 individuals with obesity, and to evaluate its association with the presence of MUO.

Methods We conducted a cross-sectional study on 2032 adult patients accessing our center from 2010 to 2021. Anthropometric parameters, glycolipid metabolism markers and serum IGF1 levels were obtained. ATP III criteria were adopted for the clinical diagnosis of MUO. IGF1-SDS was calculated from the mean and standard deviation of IGF1 serum levels in men and women grouped by age: 18–22; 23–30; 31–50; 51–65; > 65 years old. Student's t-test was used to assess differences between age matched MUO and metabolically healthy obese (MHO) groups. Multinomial logistic analysis (MLA) was performed to assess the association between IGF1-SDS and the probability of being diagnosed with MS.

Results The characteristics of the study population are summarized. Overall, the number of female patients with obesity was significantly

higher compared to males, who had greater BMI and higher prevalence of MUO, suggesting that women may seek medical attention earlier or may be less likely to develop MUO. IGF1-SDS in our population was 0.13 ± 0.8 and it was significantly lower in MUO compared to MHO. MLA showed that, for each unit decrease in IGF1-SDS, the chance of having MUO increased by 30%.

Conclusion Lower IGF1-SDS is associated with higher odds of suffering from MUO.

Keywords IGF-1 standard deviation score, Obesity, Metabolic syndrome, Metabolically unhealthy obesity.

P7-1

PREVALENCE OF OBESITY. EXPERIENCE OF OUR PEDIATRIC OBESITY CLINIC CENTER

D. Ojeda Mercado[1], D. Dellepiane[1]

[1]Dietologia e Nutrizione Clinica Ospedale Koelliker di Torino Torino

Introduction Obesity is the most common metabolic disease in pediatric age in industrialized countries. In Italy, in 2016, the prevalence of childhood obesity and overweight were estimated at 9.3% and 22.5% respectively. It is important to understand that obese children risk to develop metabolic diseases. The objective of this study is to obtain an initial photograph of the pediatric population visited within our clinic.

Materials and methods Due to the significant increase in metabolic diseases associated to the pediatric age, our team decided to collect data belonging to pediatric patients with metabolic problems. The sample analysed consists of 53 children. The following values were calculated: weight, BMI (percentile), blood pressure (diastolic and systolic percentiles), evidences for indirect signs deriving from metabolic, osteo-articular and respiratory alterations.

Results The average age of patients was 12.22 years. The initial average BMI was 28.85 (average of 96.93 percentile). The average percentile of sistolic blood pressure was 91.18 and the average diastolic blood pressure was 92.62. 33.96%% have striae rubreae, 43.39% have flat foot, 41.50% valgus knee, 16.98% have gynecomastia.

Conclusions In order to reduce the possible risk of developing obesity-related concussions, it is essential to treat this disease in advance during childhood. The analysis provided the initial data that will be used and compared with future data gathered from patients in the clinic.

P7-2

EFFECTS OF CLASSROOM WATER SUPPLEMENTATION ON HYDRATION STATUS IN MIDDLE-SCHOOL ADOLESCENTS: A RANDOMIZED CONTROLLED STUDY

S. Basilico[1], C. Dubini[1], G. Capitanio[1], F. Boniardi[1], I. Prandoni[1], M. Maiocchi[1], E. Stella[1], F. Sironi[1], C. Saccomani[1], L. Morricone[1], M. Carruba[2], M. M. Corsi Romanelli[3], A. E. Malavazos[1]

[1]Endocrinology Unit, Clinical Nutrition and Cardiovascular Prevention Service, IRCCS Policlinico San Donato San Donato Milanese, [2]Department of Medical Biotechnology and Translational Medicine, Center for Study and Research on Obesity, University of Milan Milano, [3]Operative Unit of Laboratory Medicine1-Clinical Pathology, Department of Pathology and Laboratory Medicine, IRCCS Policlinico San Donato San Donato Milanese

Introduction Adolescents should consume at least 1.5 L of water per day, according to EFSA advice. However, more than 80% of adolescents have inadequate water intake. In Italian schools, free access to water is limited and water consumption is allowed only at lunch or at break time. The aim of the study was to evaluate whether free

access to water in the classroom could improve and maintain hydration status in middle-school teenagers.

Methods A randomized controlled study was conducted on ten classes from a middle-school in an urban area around Milan from January to May 2019. A total of 161 students, age 12.5 ± 0.6 years, 55% male, from ten classes were involved. Five classes were randomly assigned to an intervention group (n = 81 students) and five classes to a control group (n = 80 students). Only the intervention group received water supplementation through a water dispenser placed inside the classrooms. Changes in the school environment (educational posters) and individual reinforcement tools (school lessons, textbook, text messages, pedometer and re-usable water bottles) were included. Hydration status was assessed by osmolality assay conducted on urine samples collected at the beginning and end of the school day both in January and May.

Results In the intervention group in January, the percentage of adolescents who were dehydrated in the morning (56%) decreased significantly in the afternoon (23%), while the percentage of adolescents who were hydrated increased from 44 to 77% (p < 0.000). In May, we still observed a significant decrease of dehydration status (from 59 to 40%) and an increase of hydration status (from 41 to 60%) between morning and afternoon (p = 0.01). In the control group, no significant changes in hydration status were observed between morning and afternoon both in January (p = 0.87) and May (p = 0.59).

Conclusions Our results showed that changes in classroom environment can promote proper water consumption and lead to an improvement in the hydration status of adolescents.

P7-3
ASSOCIATIONS AMONG NUTRITION AND WEIGHT STATUS AND COGNITIVE OUTCOMES IN PRESCHOOL CHILDREN

F. Granziera[1], M. A. Guzzardi[2], P. Iozzo[2]

[1]*Scuola Superiore Sant'Anna Pisa,* [2]*Institute of Clinical Physiology, National Research Council (CNR) Pisa*

Obesity and malnutrition affect physical and mental health. Recent evidence suggests that children's cognitive development may be sensitive to dietary components. We investigated the associations among habitual food consumption, cognitive development and BMI in preschool children.

This study included n = 65, 5-year old children (35/30 boys/girls) of the Pisa birth cohort. We collected food frequency questionnaires (FFQ), and estimated calorie and nutrients intakes by using Italian national databases (BDA-IEO, CREA). Then, adherence scores to a Mediterranean Diet (MD) were calculated. Cognition was assessed by using the Griffiths Mental Development Scales (GMDS) (n = 54). Regression models adjusted for sex, maternal age and intelligence quotient, and family socioeconomic status were used.

Vegetable and folate intake were directly linked with personal social scores (r = 0.35, *p* = 0.02; r = 0.36, *p* = 0.02); dairy products intake was related with performance scores (r = 0.31, *p* = 0.05); eggs and vitamin D were associated with eye-and-hand coordination scores (r = 0.37, *p* = 0.02; r = 0.36, *p* = 0.02). The MD score was higher in children in the highest GMDS performance tertile (5.6 ± 0.4 vs 3.7 ± 0.2, *p* = 0.02; *vs* 3.8 ± 0.2, *p* = 0.01, for high/medium/low tertiles), and lower in children with low practical reasoning (3.3 ± 0.4 vs 4.8 ± 0.5, *p* = 0.04; vs 4.8 ± 0.4, *p* = 0.02, for low/medium/high tertiles). Furthermore, red/processed and white meat consumption was related to BMI (r = 0.32, p = 0.04; r = 0.49, p = 0.001), and BMI (gender-, age-specific z-score) was negatively related to practical reasoning scores (r = − 0.37, p = 0.01).

In conclusion, in preschool children adherence to MD, and consumption of vegetables, dairy products, eggs, vitamin D and folate seemed protective, whereas BMI (reinforced by the intake of meat) was negatively associated with cognition. Overall, nutritional choices are important to promote healthy development since early life.

P7-4
A MACHINE LEARNING APPROACH TO ASSESS POOR ORAL HEALTH AS A PREDICTOR OF OBESITY IN THE AGING POPULATION: THE SALUS IN APULIA STUDY

R. Zupo[1], F. Castellana[1], V. Dibello[2], R. Rucco[1], G. De Pergola[3], A. Memola[3], S. M. Fanelli[3], R. Sardone[1]

[1]*Unit of Research Methodology and Data Sciences for Population Health, National Institute of Gastroenterology "Saverio de Bellis," Research Hospital, Castellana Grotte, Bari, Italy Bari,* [2]*Department of Orofacial Pain and Dysfunction, Academic Centre for Dentistry Amsterdam (ACTA), University of Amsterdam and Vrije Universiteit Amsterdam, Amsterdam, The Netherlands Amsterdam,* [3]*Unit of Geriatrics and Internal Medicine, National Institute of Gastroenterology "Saverio de Bellis," Research Hospital, Castellana Grotte, Bari, Italy Bari*

Oral skills are key for essential daily functions and thus highly involved in contributing to overall health status, especially in the growing aging population. There is a consistent body of evidence that perceived oral health may influence individual lifestyle by shaping dietary intake and food choices, and as much evidence that dietary behaviors are closely tied to multi-level disease trajectories, including obesity.

We used the 12-item Geriatric Oral Health Assessment Index (GOHAI) questionnaire to cross-sectionally assess perceived oral health-related quality of life (OHRQoL) in relation to body weight in a subset of the population-based Salus in Apulia Study.

At baseline, 208 older adults (49% M, 51% F) aged 65 + years were evaluated for anthropometric, metabolic, and routine laboratory parameters. All subjects completed their OHRQoL survey under the supervision of two dental hygienists and were divided into two categories according to obesity phenotype (BMI $\geq$ 30 kg/m^2).

Each of the twelve GOHAI items was applied separately using a machine learning algorithm, i.e., the random forest (RF), to avoid collinearity effects. Each one was ranked according to the predictive power on obesity and scored using the mean decrease accuracy (MDA) parameter. The most powerful negative predictors for obesity with a mean decrease accuracy greater than 4 was items 2 ("How often did you have trouble biting or chewing any kinds of food, such as firm meat or apples?"), 9 ("How often were you worried or concerned about the problems with your teeth, gums, or dentures?"), and 1 ("How often did you limit the kinds or amounts of food you eat because of problems with your teeth or denture?") of the GOHAI, reporting an MDA of 7.42, 5.99, and 4.04, respectively.

A poor OHRQoL, especially in physical and psychosocial function domains, was found to feature the obesity phenotype in the elderly.

P7-5
OBESITY AND SOCIAL DEPRIVATION IN NON-INSTITUTIONALIZED ELDERLY PEOPLE: RESULTS FROM SALUS IN APULIA STUDY

L. Lampignano[1], F. Castellana[1], R. Zupo[1], T. Lozupone[2], G. Campanile[2], M. Laera[2], C. Sportelli[2], G. De Pergola[3]

[1]*Unità di Metodologia e Gestione dati, IRCCS Saverio de Bellis Castellana Grotte,* [2]*Direzione Scientifica, IRCCS Saverio de Bellis Castellana Grotte,* [3]*UOS Geriatria, IRCCS Saverio de Bellis Castellana Grotte*

Background Social determinants have been designated as a relevant risk factor for many diseases and conditions that have a significant worldwide impact on health. With the rising prevalence of obesity and the risk of increased dependency among the elderly, defining the relationship between obesity and social deprivation is becoming highly relevant. In this regard, we explored the relationship between social deprivation and obesity in a population over 65.

Methods We analysed data from the Salus in Apulia study, a population-based sample of residents of Castellana Grotte (Bari, Italy) aged 65 years and older. These participants underwent clinical, physical, and laboratory assessments. Obesity was defined by a BMI $\geq$ 30 kg/m^2 and categorised in three classes. Social deprivation was quantified by Deprivation in Primary Care Questionnaire (DiPCare-Q) and expressed in three distinct dimensions: material, social and health deprivation. The relationship has been investigated through linear regression models. The analyses were adjusted for gender, age and education level.

Results 1354 subjects (47% men) were recruited in this study. The mean age of the population was 73.8 $\pm$ 6.4 years. The prevalence of obesity was almost 30%. In the adjusted model, Obesity was associated with a higher level of social deprivation among older and non-institutionalized subjects (β = 0.01, standard error 0.00, coefficient interval 95% 0.01 to 0.02)

Conclusion Obesity and social deprivation might have a bidirectional relationship, with each impacting the other. Thus, obesity screening and prevention also in the elderly continue to be a primary focus for action. At the same time, detecting and asking patients about their actual and subjective condition of deprivation is thus the first step in building future social interventions. Therefore, doctors, epidemiologists, and health workers must detect deprivation and prevent obesity in order to enhance public health and limit health inequities

P7-6
CORRELATION BETWEEN BODY FAT ASSESSED BY DUAL X-RAY ABSORPTIOMETRY (DXA) AND SERUM LEVELS OF LEPTIN AND ADIPONECTIN IN A GROUP OF LIPODYSTROPHY PATIENTS

C. Pelosini[1], M. Paoli[1], M. Davini[1], D. Gilio[2], S. Magno[2], G. Ceccarini[2], P. Fierabracci[2], M. R. Sessa[1], F. Santini[2]

[1]*Chemistry and Endocrinology Laboratory, University Hospital of Pisa PISA,* [2]*Obesity and Lipodystrophy Center, University Hospital of Pisa PISA*

Introduction Lipodystrophy syndromes are extremely rare disorders characterized by deficiency of body fat and reduction of synthesis and secretion of adipocyte-specific proteins, including leptin and adiponectin.

Aim Aim of our study was to correlate fasting leptin and High Molecular Weight (HMW) adiponectin levels with total body fat assessed by Dual X-ray Absorptiometry (DXA) in a cohort of patients affected by lipodystrophy.

Subjects and methods Forthy-two patients with five different type of lipodystrophy, were evaluated: 4 patients with Generalized Lipodystrophy (GL), 5 with Progeroid Syndrome, 8 with Dunnigan Syndrome (FPLD type 2), 12 with Acquired Partial Lipodystrophy and 13 with Familial Kobberling Syndrome (FPLD type 1). Leptin concentration was measured by ELISA (normal range 2.43–28.0 ng/ml) while HMW adiponectin was measured by CLEIA (normal range 1.04–13.58 µg/ml).

Results Serum leptin and HMW adiponectin levels:

Type of lipodystrophy	Leptin (ng/ml): mean $\pm$ SD	HMW adiponectin (µg/ml): mean $\pm$ SD
Generalized Lipodystrophy	2.20 $\pm$ 1.71	0.28 $\pm$ 0.13
Progeroid syndrome	3.58 $\pm$ 2.78	1.60 $\pm$ 1.67
Familial partial Lipodystrophy type 2	4.86 $\pm$ 3.85	2.31 $\pm$ 1.59
Acquired partial Lipodystrophy	9.06 $\pm$ 4.86	3.56 $\pm$ 2.35
Familial partial Lipodystrophy type 1	24.64 $\pm$ 10.08	2.88 $\pm$ 1.59

Highly significant correlations between the percentage of total body fat and serum leptin levels (R = 0.85; p value = < 0.0001) or serum HMW adiponectin levels (R^2 = 0.54; p value = 0.0002) were observed.

Conclusion Serum concentrations of leptin and HMW adiponectin are reduced in patients affected by lipodystrophy proportionally to the extent of fat loss. Measurement of leptin and adiponectin serum levels may be helpful to establish the diagnosis of lipodystrophy subtypes.

P7-7
CLINICAL AND IMMUNOLOGICAL CHARACTERISTICS OF PATIENTS WITH BARRAQUER-SIMONS SYNDROME

S. Magno[1], G. Ceccarini[1], D. Gilio[1], C. Pelosini[2], S. Fornaciari[3], R. Jaccheri[1], P. Fierabracci[1], M. R. Sessa[2], F. Santini[1]

[1]*Obesity and Lipodystrophy Center, Endocrinology Unit, University Hospital of Pisa Pisa,* [2]*Chemistry and Endocrinology Laboratory at University Hospital of Pisa Pisa,* [3]*Immunogenetics Laboratory, University Hospital of Pisa Pisa*

Background Barraquer–Simons syndrome (BSS), an acquired form of lipodystrophy characterized by the loss of upper body subcutaneous fat, affects the face, the upper limbs and trunk. Autoimmune diseases are sometimes associated with BBS. Patients tend to have low C3 serum levels, the presence of C3 nephritic factor autoantibody, and may develop membranoproliferative glomerulonephritis.

Methods Nine patients were diagnosed with BSS on the basis of typical loss of subcutaneous adipose tissue. Biochemical tests, organ-specific autoantibodies, non-organ-specific autoantibodies, and HLA status were assessed.

Results Patients were predominantly female (7:2), with a median age of 36.7 years (range 11–64 years). The onset of lipodystrophy occurred during childhood and only three patients developed the disease in adulthood. C3 hypocomplementemia was present in 44% of patients compared with a prevalence of 74% reported in the literature. At least one of the autoantibodies tested was present in every patient. In particular, anti-gastric parietal cells were detected in 22%, anti-glutamic acid decarboxylase in 22%, anti-thyroid peroxidase in 11%, anti-nuclear antibodies in 66%, anti-extractable nuclear antigens in 11% and Coombs test in 33% of patients. Mean leptin and adiponectin levels ($\pm$ SD) were 7.2 ng/ml ($\pm$ 5.9) and 4.5 ng/ml ($\pm$ 2.2), respectively. The most frequent alleles were HLA-A 02:01 (31%) and HLA-DRB1*11 (31%), which have a fairly high frequency (22.8% and 23.2%) in the general population as well. Further, 44% of patients had diabetes or insulin resistance, 55% dyslipidaemia and 66% hepatic steatosis.

Conclusion Our data confirm that BBS usually starts in childhood and is often associated with autoimmune diseases. However, the prevalence of C3 hypocomplementemia in our cohort was lower than what currently reported in the literature. Metabolic complications were quite common but none of our patients showed proteinuria or signs of membranoproliferative glomerulonephritis.

P7-8
EVALUATION OF THE OXIDATIVE STRESS IN PATIENTS AFFECTED BY LIPODYSTROPHY

D. Gilio[1], G. Ceccarini[1], S. Magno[1], C. Pelosini[2], R. Sessa[2], M. Franzini[3], L. Caponi[3], F. Santini[1]

[1]*Obesity and Lipodystrophy Center, Endocrinology Unit, University Hospital of Pisa Pisa,* [2]*Chemistry and Endocrinology Laboratory at University Hospital of Pisa Pisa,* [3]*Laboratory of Clinical Pathology at University Hospital of Pisa Pisa*

Lipodystrophic syndromes are rare and heterogeneous disorders characterized by subcutaneous fat loss, in the absence of a nutritional deprivation or a catabolic state. Principal lipodystrophies (LD) are: Congenital Generalized Lipodystrophy (CGL), Congenital Lipodystrophies with traits of precocious aging (progeroid subtype, PG), Familiar Partial Lipodystrophies type 1 (FPL1) and type 2 (FPL2), acquired generalized lipodystrophy (AGL) and acquired partial lipodystrophy (APL).

Aim of this study was to investigate the potential relevance of oxidative stress in our cohort of lipodystrophic patients. To this purpose we collected samples from 50 patients (CGL n = 4, FPL1 n = 16, FPL2 n = 9, APL n = 15, PG n = 6) and we measured plasma glutathione peroxidase (GPX), glutathione reductase (GR) e superoxide dismutase (SOD), enzymes capable of transforming free oxygen radicals in harmless metabolites. The derivates of the reactive oxygen metabolites (d-Roms) were measured through a photometric test.

In FPL and APL mean d-Roms were found increased (mean $\pm$ SE: 371 $\pm$ 27 and 302 $\pm$ 18 respectively), above the reference range (250–300 U.CARR). This finding was striking especially in PG patients (476 $\pm$ 103, p < 0.05 compared to the other forms). In the whole LD group mean GR concentrations were 5.04 $\pm$ 0.29 (normal values 4.7–13.2 U/g Hb), while GPX levels were within the normal range. GR an GPX values were not significantly different among the various subtypes of LD. Mean SOD concentrations were higher than the reference interval (1100–1600 U/g Hb) in CGL and FPL2 (1897 $\pm$ 117 and 1842 $\pm$ 140 respectively).

In conclusion, the results of this study indicate that patients with lipodystrophy display an increase of oxidative stress that may contribute to and accelerate the complications of their disease, in particular in subtypes associated with progeroid traits.

P8-1
DOES OBESITY WORSEN SEVERITY OF MEDULLARY THYROID CARCINOMA? RESULTS FROM A CROSS-SECTIONAL STUDY

D. LAUDISIO[1], G. Pugliese[1], R. Modica[1], L. Barrea[2], S. Savasatano[1], A. Colao[1], G. Muscogiuri[1]

[1]*Dipartimento di Medicina Clinica e Chirurgia, Unità di Endocrinologia, Università degli Studi di Napoli "Federico II'', Napoli; Napoli,* [2]*Dipartimento di Scienze Umanistiche, Università Telematica Pegaso, Napoli Napoli*

Introduction Obesity is a risk factor for the incidence of different types of cancer. Moreover, obesity has been reported to worsen the severity of some type of cancers. Thus we aim to investigate if obesity could have a role on severity of Medullary thyroid carcinoma (CMT). *Methods* In this cross-sectional study 48 patients (54.2% females; 60.1 $\pm$ 15.7 years) were consecutively enrolled. Anthropometric (BMI, waist (WC) and hip circumference (HC)) and metabolic parameters (fasting plasma glucose (FPG), total cholesterol (TC), triglycerides (TG) (mg/dl)), Systolic (SBP) and Diastolic (DBP) blood pressure (mmHg) were collected. The severity of CMT was assessed by plasma calcitonin (pg/ml) and carcino-embryonic antigen (CEA) levels (ng/ml).
Results Twenty-seven patients (54.2%) have weight excess (WE) (BMI 31.9 $\pm$ 4.8 kg/m^2) and 21 patients (45.8%) were normal weight (NW) (BMI 22.6 $\pm$ 1.5 kg/m^2). At diagnosis, compared to NW patients, the subjects with WE, were more likely to have a significative higher FPG levels (96.4 $\pm$ 15.1 vs 88.2 $\pm$ 7.6 p = 0.01), TC (206.2 $\pm$ 33.9 vs 176.3 $\pm$ 48.5 p = 0.02), TG (134.4 $\pm$ 63.9 vs 82.8 $\pm$ 33.9 p = 0.001), WC (114.7 $\pm$ 10.4 vs 1.6 $\pm$ 8.2 p < 0.001), HC (117.9 $\pm$ 10.3 vs 100 $\pm$ 6.7 p < 0.001), SBP (143.5 $\pm$ 13.6 vs 122.1 $\pm$ 11.3 p = 0.01) and DBP (84.6 $\pm$ 5.2 vs 76.2 $\pm$ 7.2 p < 0.001). Both calcitonin (4560.5 $\pm$ 169,727.3 vs 2653.5 $\pm$ 7601.8 p = 0.289) and CEA levels (50.6 $\pm$ 107.2 vs 25.8 $\pm$ 43.4 p = 0.611) had a tendency to be higher in patients with obesity compared to controls although they did not reach statistical significance. Correlation analyses were performed to investigate the association of BMI with biomarkers of severity of CMT, i.e. calcitonin and CEA. The BMI was positively associated with plasma calcitonin and CEA levels (r = 0.289 p = 0.04; r = 0.436 p = 0.002, respectively). Furthermore, the higher the CEA, the higher, WC and FGP (r = 0.322 p = 0.02; r = 0.326 p = 0.02, respectively).No correlations were found between calcitonin with anthropometric and metabolic parameters. A multiple linear regression we performed, and BMI was found to be the most powerful predictor of CEA concentration (p = 0.02).
Conclusion In our study subjects with obesity had a worst severity of MCT compared to normal weight patients thus suggesting that the treatment of subjects with MCT should also include a careful anthropometric and metabolic assessment.

P8-2
OBESITY CARDIOMYOPATHY AND DEGREE OF OBESITY

M. C. Pelle[1], I. Zaffina[1], F. Giofrè[1], S. Lucà[1], V. Forte[1], F. Arturi[1], C. Cloro[2], A. Sciacqua[1], F. Arturi[1]

[1]*Department of Medical and Surgical Sciences, University "Magna Graecia" of Catanzaro Catanzaro, Italy,* [2]*Unit of Cardiology "S.S. Annunziata" Hospital of Cosenza Cosenza, Italy*

Background Obesity cardiomyopathy is a heart failure unexplained by others etiologies that can vary from a subclinical left ventricular dysfunction to overt dilated cardiomyopathy.
Aim To evaluate the changes in echocardiogram in both normotensive and hypertensive obese and non obese subjects.
Methods Three hundred and eighty three subjects (236 F–147 M) were enrolled. All underwent anthropometrical evaluation and echocardiographic examination. They were divided into two groups based on BMI: non-obese subjects (BMI < 30 kg/m^2) and obese subjects (BMI $\geq$ 30 kg/m^2). The obese subjects were divided in different degrees (groups) of obesity according with obesity classification: group 1 = BMI > 30 < 35, 2 = BMI > 35 < 40, 3 = BMI > 40 kg/m^2.
Results Obese subjects showed a progressive increase in left atrial diameter (LAD) (P = 0.000), left ventricular end-diastolic diameter (LVEDD) (P = 0.000), left ventricular end-systolic diameter (LVESD) (P = 0.001), ventricular septum (P = 0.000) and cardiac mass (P = 0.000) according to the degree of obesity. Subjects in the

3° group of obesity showed higher value of LAD and LVESD when compared with subjects in first two groups (P = 0.000; P = 0.032; P = 0.000; P = 0.00, respectively). Similarly, subjects in the 3° group of obesity showed higher value of ventricular septum and cardiac mass when compared with the first two groups of obesity and with non-obese subjects (P = 0.00; P = 0.002; P = 0.000; P = 0.005; P = 0.000; P = 0.000, respectively). The Pearson correlation coefficients were 0.235, 0.217, 0.240, 0.280, 0.200 between degree of obesity and respectively LAD, ventricular septum, cardiac mass, LVEDD and LVESD. Adjusting data for hypertension, linear regression documented that degree of obesity predicts echocardiographic changes (LAD, LVEDD, LVESD) better than hypertension.
Conclusions Our data suggested that the in obese subjects the severity of cardiomyopathy is correlated with degree of obesity and that the degree of obesity is a better predictor than hypertension for echocardiographic changes.

P8-3

CARDIOMETABOLIC ALTERATIONS IN OBESE AND NON OBESE PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME

F. Arturi[1], M. C. Pelle[1], B. Tassone[1], C. Cloro[2], I. Zaffina[1], F. Giofrè[1], S. Lucà[1], C. Clausi[1], F. Sirianni[1], L. Mancuso[1], S. Miceli[3], R. Maio[3], A. Sciacqua[1], F. Arturi[1]

[1]Department of Medical and Surgical Sciences, University "Magna Graecia" of Catanzaro, Italy Catanzaro, [2]Unit of Cardiology "S.S. Annunziata" Hospital of Cosenza, Italy Cosenza, [3]"Mater Domini" University Hospital, Catanzaro, Italy Catanzaro

Introduction Obesity and Obstructive Sleep Apnea Syndrome (OSAS) have been recognized as two of the major cardiovascular risk factors and often coexist in the same patient.
Aim To evaluate cardiometabolic profile, echocardiographic alterations and the presence of arrhythmias in obese and non obesepatients with OSAS.
Methods Fiftyeight obese and 49 non obese patients were enrolled. On the first day, subjects underwent anthropometrical evaluation and a venous blood sample was drawn for biochemical and hormonal determinations. On the second day, after a 12-h fasting, a 75 g OGTT was performed. The insulin resistance was evaluated by HOMA-IR. All the patients underwent polysomnographic evaluation, in order to diagnose the OSAS, and a simultaneous 12-lead Holter ECG to evaluate the presence of nocturnal arrhythmias. In addition, echocardiographic examination has been performed.
Results Obese patients showed a more severe OSAS compared to non-obese patient as shown by higher values of AHI (26.37 ± 24.95 vs 16.58 ± 14.07; $P < 0.05$), TC90 (19.61 ± 24.45 vs 8.63 ± 17.80; $P < 0.05$) and ODI (40.55 ± 27.41 vs 21.06 ± 22.78; $P < 0.05$). In obese patients we also found a significant reduction of both ejection fraction (55.54 ± 7.97 vs 66.52 ± 8.95; $P < 0.05$) and A-wave (0.75 ± 0.17 vs 0.83 ± 0.19; $P < 0.05$). In 10 obese patients with OSAS (20%),12-lead Holter ECG showed during apnea the presence of cardiac pause > 3 s. In obese population alone we demonstrated a significant negative correlation between AHI and E-wave ($r = -0.3$; $P = 0.04$) and a positive correlation with interventricular septum ($r = 0.38$; $P = 0.01$) and left ventricular mass ($r = 0.32$; $P = 0.02$). Post-hoc analysis shown how these findings maintained statistical significance even when the obese patients were stratified in subgroups according to the severity of OSAS.
Conclusions Our data, even if preliminary, seem to indicate that OSAS is not only linked to obesity but also acts as a negative factor on the cardiovascular parameters.

P8-4

KIDNEY FUNCTION AND ACCURACY OF THE FORMULAS FOR THE ESTIMATION OF GLOMERULAR FILTRATE RATE (GFR) IN PATIENTS WITH SEVERE OBESITY

G. Salvetti[1], A. Basolo[1], A. Semeraro[1], P. Piaggi[2], S. Bechi Genzano[1], G. Scartabelli[1], A. Meola[1], R. Jaccheri[1], P. Fierabracci[1], F. Santini[1]

[1]Obesity and Lipodystrophy Center, Endocrinology Unit, University Hospital of Pisa, Pisa, Italy, [2]Department of Information Engineering, University of Pisa, Pisa, Italy

Introduction Obesity is associated with hyperfiltration and glomerular hypertension and it is considered a risk factor for kidney damage. The common formulas used to estimate the GFR by using serum creatinine value are not validated in patients with severe obesity.
Aim The aim of this study was to compare the results of GFR estimation calculated by the common formulas (Modification of Diet in Renal Disease, MDRD; Chronic Kidney Disease Epidemiology Collaboration, CKD-EPI; Cockroft-Gault, CG) to those obtained by measurement of the creatinine clearance (CrCl in 24-h urine collection) in a population of patients with severe obesity.
Methods 183 patients (125 F/58 M) with severe obesity (BMI: 48.3 ± 7.83 kg/m^2) were evaluated. All subjects underwent 24-h urine collection to measure CrCl, microalbuminuria and GFR estimation by MDRD, CKD-EPI and CG formulas.
Results Age (inversely) and BMI (positively) were significantly related to CrCl in a multivariate analysis including anthropometrical measures, HOMA index, presence/absence of diabetes mellitus and/or hypertension. The mean $\pm$ SD CrCl was 166 ± 63 and increased of 2 ml/min for each point of BMI. Patients with microalbuminuria (> 30 mg/24 h) showed a CrCl significantly higher than those without microalbuminuria (188 ± 72 and 161 ± 60, respectively, $p < 0.05$). The CG formula significantly overestimated CrCl (214 ± 77 ml/min, $p < 0.0001$) while CKD-EPI and MDRD significantly underestimated CrCl (135 ± 30 and 121 ± 39 ml/min, respectively, $p < 0.0001$). To improve the accuracy of the CrCl estimation, we modified the CG formula by reducing the impact of body weight. No difference was observed between this new formula, named CG96, and CrCl ($p = 0.14$).
Conclusions In a cohort of patients with severe obesity, the estimation of renal function by common formula, my lead to spurious results. The CG96 formula, if validated in larger cohorts, may turn useful for the clinical management of these patients.

P8-5

DIFFERENCES OF ESTIMATED GLOMERULAR FILTRATION RATE IN OBESE PATIENTS WITH RENAL NORMO-FUNCTION: MDRD STUDY VS CKD-EPI EQUATION

I. Zaffina[1], V. Forte[1], R. Pujia[1], S. Lucà[1], F. Giofrè[1], M. C. Pelle[1], F. Arturi[1]

[1]Department of Medical and Surgical Sciences, University "Magna Graecia" of Catanzaro Catanzaro, Italy

Background Obesity is a risk factor for CVD, hypertension, diabetes and kidney disease. In obese patients, a mechanism of hyperfiltration occurs to meet the heightened metabolic demands of the increased body weight, that can raise the risk of developing Chronic Kidney Disease.Is not completely clear if the use of the CKD-EPI equation is more accurate in the determination of eGFR than MDRD in obese patients.
Aim To evaluate changes in eGFR in obese patients with renal normofunction and to evaluate the differences in the eGFR in obese patients with and without metabolic syndrome (MS) and renal normofunction.

Methods 159 obese patients (96 F, 63 M) with (n = 80) and without (n = 79) MS were enrolled at University Magna Graecia of Catanzaro. All underwent an anthropometrical evaluation and a venous blood simple.

Results The patients were divided based on BMI and data showed significantly differences in the values of creatinine between the three groups (between three groups *P* = 0.01; between I*vs*III grade of obesity *P* = 0.02). No differences between grades of obesity and renal function estimated by CKD-EPI and/or MDRD, respectively, have been observed. Obese patients with MS showed more elevated values of creatinine than without MS (*P* = 0.019) and eGFR estimated by CKD-EPI was significantly higher in obese patients without MS than obese with MS (*P* = 0.016). Obese subjects were also stratified in tertiles according to levels of eGFR (CKD-EPI) and there were not differences in the BMI between the three groups.

Conclusion Our data demonstrate no significantly differences in eGFR using MDRD or CKD-EPI equations in obese patients with renal normofunction. There are no evidences that allow us to prefer one equation over the other. Interestingly, eGFR estimated was significantly lower in obese patients with MS than obese without MS, that suggest the presence of other risk factors associated with obesity to induce a reduction of kidney function also in patients without renal injury.

P8-6
LIVER STIFFNESS FROM SHEAR-WAVE IN OBESE PATIENTS AND THE EFFECT OF WEIGHT LOSS

C. Buscemi[1], A. Pizzolato[2], A. M. Borzı[3], G. Pennisi[4], C. Randazzo[2], D. Corleo[2], A. M. Barile[3], G. Rosafio[3], S. Petta[4], S. Buscemi[3]

[1]*Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo Scuola di specializzazione in Geriatria, Università di Catania Palermo; Catania,* [2]*Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo Palermo,* [3]*Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo-Ambulatorio di Nutrizione Clinica, Obesità e Sindrome Metabolica (cod 58.01.3), Palermo,* [4]*Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo- UOC Gastroenterologia Palermo*

Background Adequate methods for the non-invasive diagnosis of non-alcoholic fatty liver disease (NAFLD) and its progression to fibrosis are needed. The shear-wave technology applied to ultrasound instruments is a promising method for the evaluation of liver stiffness, a predictive measure of liver fibrosis. We measured the shear-wave derived stiffness in obese patients before and after medical-nutritional treatment (MNT) for body weight reduction.

Materials and methods Patients underwent ultrasound examination with a 3.5 MHz probe, liver stiffness was measured using a shear-wave application (Philips EPIC 5; US). Some known predictive index/score of steatosis or fibrosis (as FLI, HSI, TYG,) were calculated.

Results Data before and after MNT were obtained from 165 patients of a cohort of 358 individuals (119 drop out; 32 had incomplete data, 42 denied consent). According to basal data (n = 358), liver stiffness was positively and significantly correlated with body weight, BMI, waist and hip circumference, WHR, HOMA-I, FLI, HSI, TYG. In 13 (7.7% men) of the 165 obese patients (34% men; P < 0.05) who underwent MNT, NAFLD was not diagnosed by echo imaging and this subgroup had stiffness values (before MNT: 3.4 ± 1.2, after

2.8 ± 1.2 kPa; P = 0.22) lower (P < 0.001) than those of the NAFLD group (before MNT: 5.9 ± 3.6, after: 4.9 ± 3.2 kPa; P < 0.001). Following MNT, 117 obese patients with NAFLD achieved a weight reduction ^{3}5% (− 9.9 ± 4.8 kg) and 35 < 5% (− 3.5 ± 2.4 kg; P < 0.001); the stiffness decreased (P < 0.001) only in the group of patients with body weight reduction ^{3}5% (D stiffness: 0.1% vs − 14.1%; P < 0.01).

Conclusions The shear-wave derived stiffness is increased in patients with echo diagnosed NAFLD. The changes in stiffness are consistent with the improvement of liver disease only after significant weight reduction (> 5%). Further studies are needed to clarify the nature of the changes in shear-wave derived stiffness with histological data from liver biopsy.

P8-7
HIGH REAL-WORLD PREVALENCE OF FIBROTIC-NONALCOHOLIC STEATOHEPATITIS (NASH) IN PATIENTS WITH OBESITY (PWO) IN AN OUTPATIENT SPECIALIST CLINIC IN ITALY

F. Ravaioli[1], M. L. Petroni[1], F. Martignoli[1], V. Osti[1], G. Bocedi[1], D. Mita[1], L. Brodosi[1], L. Pironi[1]

[1]*SSD Nutrizione Clinica e Metabolismo, IRCCS Policlinico Sant'Orsola-Malpighi, Alma Mater Università di Bologna Bologna*

Introduction Despite obesity being a major player of "metabolic dysfunction associated fatty liver disease" (MAFLD) and of non-alcoholic steatohepatitis (NASH) -leading cause of liver cirrhosis-scanty data only is available (mainly from bariatric surgery cohorts) on the prevalence of MAFLD and NASH in PwO. For this purpose, we aimed to evaluate the prevalence of MAFLD and NASH and the applicability of non-invasive tests (NITs) for fatty liver and liver fibrosis identification in an outpatient specialist obesity Centre in Italy.

Methods We screened 249 consecutive PwO newly referred to our outpatient obesity clinic between Jan-2020 to Jun-2021. MAFLD was diagnosed by abdominal ultrasound (US) and in a subgroup, hepatic fat was also assessed through controlled attenuation parameters (CAP). Fatty Liver Index (FLI), Fibrosis-4 (FIB4) and NAFLD (NFS) scores were calculated from blood chemistry data. Liver fibrosis was assessed using liver stiffness measurements (LSM) by transient elastography (FibroScan), using probe-specific LSM cut-offs to detect significant (F ≥ 2) and advanced (F ≥ 3) fibrosis and NASH cirrhosis. All patients underwent oral glucose tolerance test (OGTT).

Results 144 (57.8%), 56 (22.5%), 49 (19.6%) PwO were obesity Class I*, II, and III°, respectively. About half of PwO had type 2 diabetes (T2DM) or impaired glucose tolerance (IGT) or impaired fasting glucose (IFG) with a median HOMA index of 3.6 (IQR 2.44–4.94). According to US or FLI definitions, the prevalence of MAFLD was 90.4% and 91.6% and did not differ across obesity classes (p-value 0.264). Grading of hepatic steatosis was 25.8% (mild), 38.7% (moderate), 35.6% (severe). Median CAP values were 287 dB/m (IQR 262–337). According to LSM values, 29%, 18% and 9.8% had significant fibrosis, advanced fibrosis, and NASH cirrhosis. Prevalence of fibrosis increased across obesity classes (p-value < 0.0001) and in those with DM2/IGT. NITs significantly underestimated prevalence of fibrosis, including advanced one (NASH-cirrhosis).

Conclusion Results from a real-world setting show that as high as one-third of PwO attending obesity clinics might have NASH fibrosis or cirrhosis. We advocate for routine screening for MAFLD and NASH by LSM in PwO irrespectively of BMI.

Table: Prevalence of liver fibrosis classification in different subgroups.

Patients (n.249)	Absence of fibrosis (71%)		Significant fibrosis (23%)		Cirrhosis-NASH (5.8%)
	F0-F1 [LSM <7]	F2 [LSM≥ 7 & <8.7]	Advanced fibrosis (18%) F3 [LSM≥8.7 & LSM<10.3]	F4 [LSM≥10.3]	
Obesity I° [n.144]	117 (81.3%)	13 (9%)	9 (6.3%)	5 (3.4%)	
Obesity II° [n.56]	39 (69.6%)	8 (14.3%)	3 (5.4%)	6 (10.7%)	
Obesity III° [n.49]	21 (42.9%)	7 (14.3%)	8 (16.3%)	13 (26.5%)	
DMT2/IGT (yes) [n.113]	63 (55.8%)	20 (17.7%)	13 (11.5%)	17 (15%)	

P8-8

HYPOGLYCEMIA IN NORMOTOLERANT OBESE SUBJECTS AND RISK OF CARDIAC ARRHYTHMIAS

M. C. Pelle[1], M. Ruffo[1], I. Zaffina[1], V. Forte[1], R. Pujia[1], M. Ricchio[1], S. Lucà[1], F. Giofrè[1], C. Cloro[2], F. Arturi[1]

[1]Department of Medical and Surgical Sciences, University "Magna Graecia" of Catanzaro, Catanzaro, Italy; Catanzaro, [2]*Unit of Cardiology "S.S. Annunziata" Hospital of Cosenza, Cosenza, Italy Cosenza

Introduction Several evidences suggest a possible link between hypoglycemia and cardiovascular alterations. The most common electrocardiographic alterations observed in diabetic patients are PR interval shortening, ST-segment depression, T-wave flattening and QTc-interval prolongation. There are no data on the role of hypoglycemia on cardiac function in health obese subjects.

Aim To evaluate the effects of hypoglycemia induced by oral glucose tolerance test (OGTT) on the cardiac function in normotolerant (NGT) obese subjects.

Methods 126 NGT obese subjects (BMI > 30 kg/m^2) have been enrolled. All underwent anthropometrical evaluation and biochemical and hormonal determinations. After a 12 h fasting, a 75 g OGTT to 5 h was performed with a simultaneous 12-lead HolterECG. In case of signs of hypoglycemia and/or capillary blood glucose level ≤ 50 mg/dl, the OGTT was stopped. The insulin resistance was evaluated by HOMA-IR.

Results 22 patients were excluded due to impaired glucose tolerance (IGT) or diabetes. 78 out 104 NGT obese subjects showed hypoglycemia during OGTT and during this episode, the ECG analysis showed a significant QTc-interval prolongation (410 ± 24 ms vs 452 ± 23 ms, $P < 0.0001$). ST-segment alterations, T wave modifications, presence of supraventricular tachycardia and atrial ectopic beats were also observed. The HRV analysis showed no significant changes in the low frequency component (LF) during hypoglycemia compared to baseline (63.3 ± 15.8 vs 66.6 ± 12.7, $P = 0.1$), but a significant increase in the high frequency component (HF) was demonstrated (23.9 ± 9 vs 35.1 ± 13, $P < 0.0001$), with a significant modification of the LF/HF ratio (2.64 ± 0.9 vs 1.95 ± 1, $P < 0.0001$). In the 26 NGT subjects who did not showed hypoglycemia during OGTT, no changes in QTc or HRV were observed.

Conclusions Our data indicate that also in NGT obese subjects, hypoglycemia is able to induce alterations of the cardiac conduction and could have a proarrhythmic effect.

P8-9

GLYCEMIC VARIABILITY, ENDOTHELIAL FUNCTION AND DIET: EVIDENCES FROM A CASE REPORT OF AN OBESE-DIABETIC PATIENT WITH A 5-YEAR FOLLOW-UP

D. Corleo[1], C. Buscemi[2], C. Randazzo[1], A. M. Borzi[3], G. Rosafio[3], E. Finamore[1], S. Buscemi[3]

[1]Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo Palermo, [2]Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo; Scuola di specializzazione di Geriatria, Università di Catania Palermo, Catania, [3]Dipartimento di Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro" (PROMISE), Università di Palermo Ambulatorio di Obesità, Sindrome Metabolica e Nutrizione Clinica Palermo

Background Endothelial dysfunction (ED) is a prerequisite for atherosclerosis. In type 2 diabetes (T2D) basal and post-prandial hyperglycemia have been associated with ED. Furthermore, an increased glycemic variability (GV, expressed as CV% on the basis of continuous glucose monitoring (CGM) recording for up to 7 days) also resulted independently associated with ED, even in non-diabetic people. The Flow Mediated Dilatation of the brachial artery (FMD) is the gold-standard method to investigate endothelial function in vivo. The ability of the brachial artery to dilatate in response to the pharmacological stimulus of nitroglycerin is known as GTN and it is a measure of the structural arterial integrity. The relationship between diet, weight reduction, ED, glucose control and GV has not been investigated by clinical trials in the long-run. We describe a clinical case concerning a 5-year observation of FMD, GTN, CGM-derived GV and carotid intima-media thickness (IMT) in an obese patient with T2D, hypertension and liver steatosis, before and after medical-nutritional treatment (MNT).

Case description Mr. VA, aged 69, had the first visit in 2009 and underwent MNT, he was evaluated in 2009, 2010 and 2014. The MNT induced a stable reduction of body weight (106.2–89.9–95.4 kg), BMI (36.7–31.1–33.0 kg/m^2) and waist circumference with regression of liver steatosis. Carotid IMT progressively normalized (1.1–1.0–0.8 mm) and a marked reduction in glycemic control parameters was obtained: HbA1c %: 7.4–5.4–5.9; CGM 7-day mean blood glucose (mg/dl): 155–119–123; CGM 7-day CV(%): 45.2–28.7–14.6. The initial FMD value, suggestive of ED, improved until stabilization (3.8–7.3–6.9%). The GTN was initially compromised and progressively improved in the following years until normalization (11.8–18.8–23.1%).

Comments and conclusions Following the MNT, the ED reverted and the structural arterial integrity was restored (GTN, IMT). The GV reduction and the GTN were the only 2 measures that continued to improve at 5 years. These data may suggest that the reduction in glycemic variability probably has an important role in influencing vascular health and may represent an important goal in the management of dysmetabolic obesity.