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T6/T7:OS2.1

Living at higher altitude and incidence of overweight/obesity: Prospective analysis of the SUN cohort

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Introduction: Residence at high altitude has been associated with lower obesity rates due to hypoxia conditions. However, there is no evidence of this association in a free-living population. Therefore, our objective was to assess the association between the altitude where each participant of the SUN Project is living and the incidence of overweight/obesity.

Methods: The SUN Project is a dynamic, prospective, multipurpose cohort of Spanish university graduates with a retention rate of 90%. We included in the analysis 9,302 participants free of overweight/obesity at baseline. At the baseline questionnaire participants report their postal code and the time they have been living in their city/village. We imputed the altitude of each postal code according to the data of the Spanish National Cartographic Institute and categorized participants in tertiles. We used Cox regression models to adjust for potential confounding variables.

Results: During a median follow-up of 8.5 years, we identified 2,099 incident cases of overweight/obesity. After adjusting for age, sex, baseline body mass index, time of residence, physical activity (quartiles), sedentary behaviours (quartiles), smoking (non-smokers, current smokers, former smokers), snacking, follow a special diet, total energy intake, and adherence to the Mediterranean dietary pattern, those participants in the third tertile (>456 m) exhibited a statistically significant 13% reduction risk for the development of overweight/obesity in comparison to those in the first tertile (<124 m) (adjusted HR: 0.87; 95% CI: 0.77–0.98).

Conclusion: Living in cities of higher altitude was associated with a lower risk of developing overweight/obesity in a cohort of Spanish university graduates.

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T8:PO.110

Vitamin d supplementation promotes weight loss and waist circumference reduction in overweight/obese adults with hypovitaminosis d

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Hypovitaminosis D is associated with adiposity and higher risk of developing obesity-related complications. Intervention studies with cholecalciferol provided inconsistent results. The objective was to evaluate whether restoration of optimal vitamin D status promotes weight loss and improves metabolic serum biomarkers. Four-hundred overweight or obese patients with vitamin D insufficiency were recruited from 2011 to 2013. Participants received a balanced moderately-low-calorie diet and were assigned to 3 groups: 1) no treatment; 2) cholecalciferol 25.000 UI / month; 3) cholecalciferol 100.000 UI / month. At baseline (T0) and

after 6 months (T1) we determined: anthropometric measures, BMI, waist circumference, body composition, plasma 25-hydroxyvitamin (OH) D, fasting glucose, fasting insulin, and glycated hemoglobin. Differences were investigated using repeated measures ANOVA regardless of patient adherence to treatment (intention-to-treat analysis). Six-month supplementation with 25.000 and 100.000 UI increased serum 25(OH), but only 100.000 allowed achievement of optimal vitamin D status ($p < 0,001$) (Fig. 1). A significantly greater weight decrease was observed in the 25.000 and 100.000 UI groups ($-3,8$ kg and $-5,4$ kg) compared to untreated (-1.2 kg) (Fig. 2). Waist circumference reduction was more substantial in the vitamin D group (25.000: -4.00 cm; 100.000: -5.48 cm; untreated: -3.21 cm; $p < 0,05$) (Fig. 2). Adjustment for age, sex, and BMI did not affect statistical significance. Improved HbA1c was noted in patients supplemented with 100.000 UI, but this finding lost significance after adjustment for weight decrease. The present data indicate that vitamin D supplementation ameliorates anthropometric profiles and enhances the beneficial effects of hypocaloric diet.

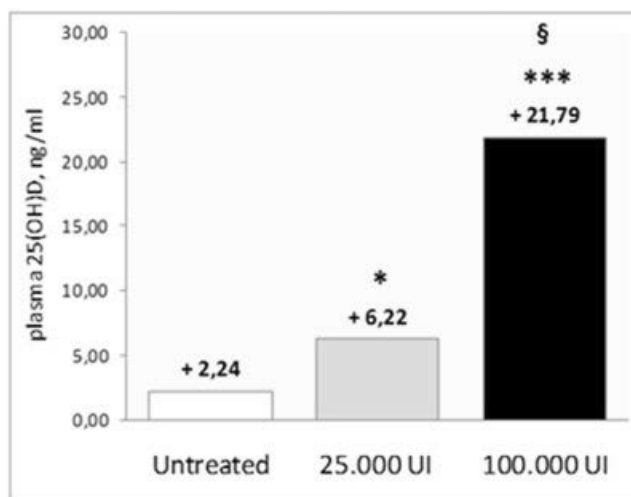


Fig. 1. Plasma 25(OH) concentration increase after 6-month cholecalciferol supplementation. RM Two-way ANOVA, Bonferroni post hoc test. * $p < 0.05$ vs untreated; *** $p < 0.001$ vs untreated; § $p < 0.05$ vs 25.000 UI

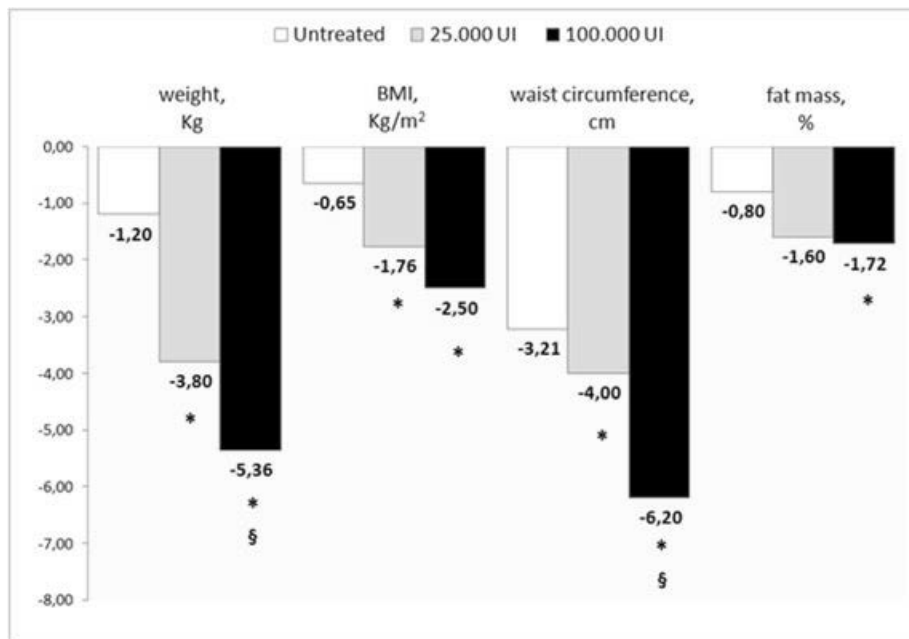


Fig. 2. Decrease in weight , BMI, waist circumference and fat mass after 6-month cholecalciferol supplementation. RM Two- way ANOVA, Bonferroni post hoc test. * $p < 0.05$ vs untreated; § $p < 0.05$ vs 25.000 UI

T3:OS2.1

Association of high dietary protein intake with the risk of weight gain and total death in subjects at high risk of cardiovascular disease

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Introduction: Although diets high in dietary protein are widely used to manage overweight and obesity, there is a lack of consensus about their long-term efficacy and safety. The aim of this study was to simultaneously assess the association of long-term high-protein consumption on body weight changes and death outcomes in subjects at high cardiovascular risk.

Methods: A secondary analysis of the PREDIMED (PREvención con Dieta MEDiterránea) trial was conducted. Dietary protein was assessed using a food-frequency questionnaire during the follow-up. Cox proportional hazard models, including macronutrient substitution models, were used to calculate the multivariate relative risk of protein intake in body weight and waist circumference changes, and the incidence of cardiovascular outcomes, total, cardiovascular and cancer death.

Results: Higher total protein intake was significantly associated with a greater risk of weight gain when protein replaced carbohydrates (HR: 1.90; 95%CI: 1.05, 3.46) but not when replaced fat (HR: 1.69; 95%CI: 0.94, 3.03). However, no association was found between protein intake and waist circumference. Contrary, higher total protein intake was associated with a greater risk of all-cause death in both carbohydrate and fat substitution models (HR: 1.59; 95%CI: 1.08, 2.35; and HR: 1.66; 95%CI: 1.13, 2.43, respectively). Animal protein was

associated with an increased risk of fatal and non-fatal outcomes when protein substituted carbohydrates or fat.

Conclusion: Higher dietary protein intake is associated with long-term increased risk of body weight gain and overall death in a Mediterranean population at high cardiovascular risk.

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T4:PO.004

Increased bioavailability of alcohol following sleeve gastrectomy – preliminary results 3 months after surgery

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Introduction: There is growing concern that bariatric surgery increases risk of alcoholism postoperatively. As several surgical procedures exist, insight into how different operative techniques influence bioavailability relatively can be valuable information when deciding for appropriate treatment. We set up a trial to compare the effect of sleeve gastrectomy versus gastric bypass on 1 year bioavailability of ethanol. This is 3 months preliminary data from the 5 first sleeve gastrectomy patients.

Methods: Participants, all with BMI > 40 kg/m², met fasting and had a standardized breakfast one hour prior to alcohol administration. Ethanol dosage was calculated on basis of preoperative total body water (TBW) estimated by bioelectrical impedance (InBody 720). Dosage was 0.4 g/kg TBW for women and 0.5 g/kg TBW for men. Test sequence (intravenous or peroral) was randomized with a washout period of minimum 48 hours. For peroral testing, participants consumed in 5 minutes vodka 40% diluted with orange juice to a concentration of 20%. For the intravenous test, ethanol 40% was diluted with glucose 5% to a concentration of 5 g/100 ml, and administered as infusion over 30 minutes in vena brachialis. Blood alcohol content (BAC) was analysed with Roche Modular P with lower detection limit of 2.2 mmol/L, and area under curve (AUC) was calculated with WinNonlin software.

Results: 3 months postoperatively uptake of alcohol was more rapid, reached higher concentrations and were detectable longer. Relative bioavailability (AUC_{last}) was considerably higher than prior to surgery.

Conclusion: Sleeve gastrectomy seems to increase bioavailability of ethanol which in turn may enhance its toxicological effects.

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T8:PO.119

Cardiometabolic risk factors and inflammation in adipose tissue are increased in obese subjects classified as metabolically healthy

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Introduction: It has been suggested that individuals with the condition known as metabolically healthy obesity (MHO) may not have the same increased risk for the development of metabolic abnormalities as their non-metabolically healthy counterparts. However, the validity of this concept has recently been challenged since it may not translate into lower morbidity and mortality. The aim of the present study was to compare the cardiometabolic/inflammatory profile and the prevalence of impaired glucose tolerance (IGT) and type 2 diabetes (T2D) in patients categorized as MHO or metabolically abnormal obesity (MAO).

Methods: We performed a cross-sectional analysis to compare the cardiometabolic/inflammatory profile of 222 MHO and 222 MAO patients (62% women) matched by age, including 255 lean subjects as reference (cohort 1). In a second cohort, we analysed the adipokine profile and the expression of genes involved in inflammation and extracellular matrix remodelling in visceral adipose tissue (VAT, n=82) and liver (n=55).

Results: The cardiometabolic and inflammatory profiles (C-reactive protein, fibrinogen, uric acid, leukocyte count and hepatic enzymes) were similarly increased in MHO and MAO in both cohorts. Moreover, above 30% of patients classified as MHO according to fasting plasma glucose exhibited IGT or T2D. The profile of classic (leptin, adiponectin, resistin) as well as novel (SAA and MMP9) adipokines was almost identical in MHO and MAO groups in cohort 2. Expression of genes involved in inflammation and tissue remodelling in VAT and liver showed a similar alteration pattern in MHO and MAO individuals.

Conclusion: The present study provides evidence for the existence of a comparable adverse cardiometabolic profile in MHO and MAO patients.

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