

Addition of deep-learning improves sensitivity with acceptable specificity, and significantly increases the number of true positive nerves detected compared to manual counting. However, the current deep learning model lacks specificity in the setting of non-specific immunostaining, which is a basis for improving further iterations of this model to facilitate study of the significance of innervation of thyroid and other cancers.

References: (1) Faulkner et al. *Cancer Discovery* (2019) doi: 10.1158/2159-8290.CD-18-1398. (2) Bankhead P et al. *Sci Rep* 2017;7(1):16878.

Adipose Tissue, Appetite, and Obesity OBESITY TREATMENT: GUT HORMONES, DRUG THERAPY, BARIATRIC SURGERY AND DIET

Severe Copper Deficiency Post-Bariatric Surgery with Serious Preventable Complications

Asma Khaled Aljaberi, MD, Hessa Boharoon, MD.

Tawam Hospital, Al Ain, United Arab Emirates.

MON-595

Copper is an essential cofactor in many enzymatic reactions vital to the normal function of the hematologic, vascular, skeletal, antioxidant, and neurologic systems. Parenteral nutrition and chronic tube feeding are used in various malabsorptive syndromes, including following gastrectomy and gastric bypass surgery. Features of copper deficiency include hematologic abnormalities (anemia, neutropenia, and leukopenia) and myeloneuropathy; the latter is a rarer and often unrecognized complication of copper deficiency.

We describe a 36-year-old Emirati woman who was referred to endocrinology service because of generalized body weakness and fatigue post bariatric surgery. The patient initially noted a lower extremity swelling in feet bilaterally that worsened in severity over time and progressed up to knees. Over a 3 month period, her ability to ambulate gradually deteriorated. She also noticed maculopapular skin rash over both shins. Patient had Sleeve Gastrectomy in 2011. Followed by conversion of sleeve to RYGB surgery in 2018 due weight loss failure. Patient is known to have well controlled hypothyroidism on thyroxine. She was prescribed vitamin D, neurobion, iron and multivitamins tablets post surgery but never been compliant. The patient was admitted with severe malnutrition due to poor oral intake over the last 5 months prior to admission. Her total weight loss was 34.5 kg (32% weight change, BMI 28.52kg/m²) in less than 9 months post surgery. Initial labs revealed severe hypoalbuminemia, normochromic anemia and neutropenia. Iron, folate, thiamine, and vitamin B12 levels were normal. Vitamin B6 level was normal at 11 mcg/L (normal = 5-50 mcg/L). The serum copper level was low at 310 µg/l (normal = 794-2023µg/l). Zinc level was low at 447 µg/l (normal = 551-925µg/l). Nutritional needs were estimated using the following formulas; 22-25 kcal/kg ideal body weight (IBW)/d and 1.5-2.0 g protein/kg IBW/d, 30-35 ml IVF/kg /d. The patient's input/output, body weight, and clinical status were monitored. Parenteral nutrition additive copper 0.3 mg/day and oral copper 8 mg daily, resulted in the rapid correction of hematologic indices over one week. Combined multivitamins supplementation and oral copper supplements alone normalized serum copper

levels over 4 weeks and resulted in resolution of weakness and body edema.

This report serves to alert physicians of the association between bariatric surgeries and subsequent severe copper deficiency in order to avoid diagnostic delays and to improve treatment outcomes.

Adipose Tissue, Appetite, and Obesity NEURAL MECHANISMS OF OBESITY

The Vagus Nerve and the Hypothalamus Mediate Different Aspects of the Anorectic Effects of PYY₃₋₃₆

Aldara Martin Alonso, MSc¹, Simon C. Cork, PhD¹, Yue Ma, PhD¹, Myrtha Arnold, Ms², Herbert Herzog, PhD³, Stephen R. Bloom, MS,DSC,FRCP,MD¹, Walter Distaso, PhD¹, Kevin Graeme Murphy, PhD¹, Victoria Salem, PhD, MMBS, MRCP¹.

¹Imperial College London, London, United Kingdom,

²Eidgenössische Technische Hochschule Zürich, Schwerzenbach,

Switzerland, ³Garvan Institute of Medical Research,

Darlinghurst, Australia.

SAT-607

Background: Drugs that safely promote weight loss are required to treat the obesity crisis. The gut hormone peptide YY 3-36 (PYY₃₋₃₆) is secreted post-prandially to suppress appetite via the Y2 receptor (Y2R). However, it is unclear whether PYY₃₋₃₆ acts directly on the Y2R in the hypothalamic arcuate nucleus (ARC) or the afferent vagus nerve to inhibit food intake. Understanding the pathways by which PYY₃₋₃₆ mediates its anorectic effects may facilitate the therapeutic targeting of this system.

Methods: Y2R knockdown in the ARC (ARC-Y2R-KD) was achieved by stereotactic injection of Cre-expressing adeno-associated virus (AAV-Cre) in Y2R-flox C57Bl/6 mice. Y2R KD in the vagus was achieved by bilateral microinjection of AAV-Cre into the nodose ganglia (NG), where the cell bodies of vagal afferents reside. An alternative germline model of sensory nerve Y2R knockdown was generated using Nav1.8-Cre mice crossed with the Y2R-flox strain (Nav1.8-Y2R-KD). Feeding behaviour over 10 days in metabolic cages and the effects of endogenously released (after oral gavage of a nutrient bolus) or exogenously-administered PYY₃₋₃₆ were investigated.

Results: NG-Y2R-KD animals had 60% reduction in NG Y2R mRNA but remained responsive to cholecystokinin, a positive control of vagal functionality. This is the first example of receptor specific adult vagal deafferentation in mice. The Nav1.8-Y2R-KD model achieved 30% receptor KD. Feeding patterns in the ARC-Y2R-KD and NG-Y2R-KD groups were highly different from their controls, with smaller, faster meals in the KD groups. The anorectic effects (at the next meal) of endogenous PYY₃₋₃₆ were attenuated in NG-Y2R-KD. Low dose exogenous PYY₃₋₃₆ at 5 µg/kg significantly reduced 2h post injection food intake (FI) in the control groups (n=8; P=0.045) but this was abrogated in the NG-Y2R-KD group. This pattern was mirrored in the Nav1.8-Y2R-KD model: low dose PYY₃₋₃₆ significantly reduced FI 1h post-IP compared to vehicle in controls (-0.19±0.05 g; P =0.036; n=8) but not in the Nav1.8-Y2R-KD (-0.004±0.111 g; n=3). Peripherally-administered PYY₃₋₃₆ at a high dose (30 µg/kg) decreased FI in all groups, including ARC-Y2R-KD.

Summary: These results suggest that endogenous PYY₃₋₃₆ modulates meal patterning. The vagus nerve mediates physiological PYY₃₋₃₆ signalling but alternative pathways, not exclusively via the ARC, may be more important in mediating its pharmacological effects. This is relevant for the design of more effective weight loss agents.

Reproductive Endocrinology HYPERANDROGENISM

Cardiometabolic Profile of Brazilian Women with Polycystic Ovary Syndrome (PCOS): A Systematic Review and Meta-Analysis

Lucas Bandeira Marchesan, MD¹, Ramon Bossardi Ramos, PhD¹,
Monica Oliveira, MD², Poli Mara Spritzer, MD, PHD¹.

¹Universidade Federal do Rio Grande do Sul, Porto Alegre RS, Brazil,

²Instituto de Medicina Integral Professor Fernando Figueira Hospital, Recife, Pernambuco, Brazil, Recife PE, Brazil.

SUN-013

Introduction. PCOS is a frequent endocrine disease and its clinical expression may be influenced by ethnicity and sociocultural backgrounds. Despite its high prevalence, few studies are available regarding clinical characteristics of Brazilian women with PCOS. The aim of this study was to summarize the available evidence regarding metabolic risks in PCOS population in Brazil through a systematic review and meta-analysis. **Materials and Methods.** We systematically searched EMBASE, MEDLINE, Cochrane Central Register of Controlled Trials for studies published until July 31, 2019.

Results. Eleven cross-sectional and case-control studies were selected for the present meta-analysis, including 898 women diagnosed with PCOS and 2176 controls. All used the Rotterdam criteria for the diagnosis of PCOS. Compared to controls, BMI was higher in PCOS [standardized mean difference (SMD) 0.67 (95% CI 0.29, 1.05) I²=91%], as well as waist circumference [SMD 0.88 (0.40, 1.37) I²=93%]. Systolic and diastolic blood pressure were higher in PCOS, SMD 0.66 (0.30, 1.01) I²=83%, SMD 0.55 (0.24, 0.87) I²=81%, respectively. Glucose and HOMA-IR were higher in PCOS, SMD 0.22 (0.02, 0.41) I²= 57%, SMD 0.78 (0.52, 1.04) I²=26% respectively. Regarding lipid profile, PCOS had higher values for triglyceride [SMD= 0.39 (0.14, 0.64, I² =63%)], total cholesterol [SMD 0.36 (0.15, 0.57, I²=57%) and LDL [SMD 0.44 (0.11, 0.78, I²=82%)] and lower values for HDL [SMD -0.56 (-0.78, -0.34) I²=68%]. **Conclusions.** Even though the studies considered were observational, including mostly small samples, the evidence from this meta-analysis indicates women with PCOS from different regions of Brazil present worse cardiometabolic profile than women without PCOS. This systematic review and meta-analysis is registered in PROSPERO (CRD42016038537).

Reproductive Endocrinology MALE REPRODUCTIVE HEALTH - FROM HORMONES TO GAMETES

Insulin-Like Growth Factor and Fibroblast Growth Factor 21 in Men with Klinefelter Syndrome.

Simon Chang, MD, PhD¹, Rikke Hjortebjerg, MSc, PhD²,
Anders Bojesen, MD, PhD³, Mette Bjerre, Associate Professor,
PhD⁴, Claus Hojbjerg Gravholt, MD, PhD, Professor⁵.

¹Sygehus Lillebaelt, Kolding, Denmark, ²Steno Diabetes Center, Odense, Denmark, ³Dep. of Clinical Genetics, Aarhus University Hospital, Aarhus, Denmark, ⁴Medical Research Laboratory Department of Clinical Medicine, Aarhus University Hospital, Aarhus, Denmark, ⁵Dep. of Endocrinology and Internal Medicine, Aarhus University Hospital, Aarhus, Denmark.

SAT-046

Background: Men with 47, XXY Klinefelter syndrome (KS) commonly present with obesity, metabolic disorders, and insulin insensitivity. The insulin-like growth factor (IGF) system has pleiotropic effects including regulation of glucose metabolism. Fibroblast growth factor 21 (FGF21) is associated with weight loss and favourable metabolic changes, but patients with obesity or type 2 diabetes might be resistant to this effect despite presenting with increased levels. **Aim:** To describe levels of components in the IGF system and FGF21 among men with KS, either treated or not treated with testosterone supplementation therapy (TT), in comparison with control males. **Methods:** A total of 66 men with KS were included, 33 without current TT and 33 with current TT. A control group of 70 healthy age-matched males were included. Serum levels of insulin-like growth factor 1 (IGF-1), insulin-like growth factor-binding protein 3 (IGFBP3), pregnancy-associated plasma protein A (PAPP-A), FGF21, and fibroblast activation protein (FAP) were compared between the three groups applying the Kruskal-Wallis test. **Results:** Levels of (IGF-1 µg/L) were not different between the groups (median (25-75 %), untreated KS 162 (140-201.5), treated KS 165 (128.5-215), controls 176.5 (150.8-214.5), p=0.5). Similarly, FGF21 levels (ng/L) were comparable between the groups (median (25-75 %), untreated KS 84.7 (53.3-217.6), treated KS 97.2 (56.4-224.8), controls 100.3 (66.0-191.0), p=0.9). Levels of IGFBP3, PAPP-A and FAP were also found to be comparable between the groups (p≥0.2). **Conclusion:** This was the first study investigating FGF21 in men with KS. Our results indicate that regulation of the IGF-1 system and levels of FGF21 are not altered in men with KS compared with age-matched controls, and that TT in men with KS does not affect these systems.

Neuroendocrinology and Pituitary CASE REPORTS IN SECRETORY PITUITARY PATHOLOGIES, THEIR TREATMENTS AND OUTCOMES

Priapism Secondary to Cabergoline

Maryam Amir, MD¹, Monica Flores, MD², Jorge Calles-Escandon, MD¹.

¹Division of Endocrinology, Metrohealth Medical Center, Case Western Reserve University, Cleveland, OH, USA, ²Fairview Hospital, Cleveland Clinic, Cleveland, OH, USA.

SAT-270

Background: Cabergoline and Bromocriptine are ergot derivative long-acting dopamine agonist that are very effective and well tolerated in patients with hyperprolactinemia. A rare and unwanted side effect of Bromocriptine is priapism, which has hardly ever been report in literature and it's not cited under the medication insert. The underlying mechanism is not totally clear, but it is well known that