

Abstracts of the Free Communications of the Fifth Clinical Congress of the Gulf Chapter of the American Association of Clinical Endocrinologists; October 5–7, 2017; Dubai, United Arab Emirates

Guest Editors

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Abstract

These are advance abstracts of the fifth Clinical Congress of the Gulf Chapter of the American Association of Clinical Endocrinologists held on October 5–7, 2017, in Dubai, UAE. The declared educational objectives of the Congress were to give a “state of the art in endocrine practice.” Plenary and symposia presentations were delivered by international and regional key opinion leaders. In addition, free communications on current research and clinical practice in the region and worldwide were presented. We present here abstracts of the Congress as submitted by the authors of the free communications after minimal restyling and editing to suit the publication requirements of the journal. We hope that by publishing them in this open access journal, we extend the benefit to those who could not make it to the live presentations.

Keywords: Adrenal, diabetes, education, hypoglycemia, pituitary, reproductive, research, thyroid

Oral Communications

OC1.1. Common Genetic Variants in Vitamin D-Binding Protein Gene Modify the Response to Vitamin D Supplementation

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Background: Genetic variations in Vitamin D-binding protein (DBP) gene are known to affect 25(OH)D levels in various population. However, the influence of these genetic variants on 25(OH)D levels in Saudi population is largely unknown. The study aims to determine the

INTRODUCTION

The fifth Clinical Congress of the Gulf Chapter of the American Association of Clinical Endocrinologists was held on October 5–7, 2017, in Dubai, UAE. Since its inception, the AACE Gulf Chapter clinical congress has been widely accepted as the endocrine event of the year in the region. The Congress maintained its standards and expanded its delegates over the years. The declared educational objectives of the Congress were to give a “state of the art in endocrine practice.” It caters primarily for the professional development needs of endocrinologists and internal medicine with special interest in diabetes and endocrinology. However, many primary care physicians, doctors in training and specialist nurses and educators found many aspects of its contents particularly relevant. Plenary and symposia presentations were delivered by international and regional key opinion leaders. In addition, free communications on current research and clinical practice in the region and worldwide were presented. The AACE Gulf Chapter see this as a core role in its mission to improve care by education and research. The best 3 abstracts in each category (oral and poster) received valuable prizes granted by the Board of Directors. We present here abstracts of the Congress as submitted by the authors of the free communications after minimal restyling and editing to suit the publication requirements of the journal. In the past, we have published the Congresses proceedings in *Ibnosina Journal of Medicine and Biomedical Sciences* [refs 1-5]. Now, the Chapter has its own Journal, we hope. We hope that by publishing them in the AACE- Gulf Chapter’s own journal, we extend the benefit to those who could not make it to the live presentations. The abstracts are presented as oral and poster communications that are published separately under their relevant group.

influence DBP gene polymorphisms serum 25(OH)D concentration before and after Vitamin D supplementation. **Methods:** A total of 235 Saudi adults were recruited, of which 146 participants with Vitamin D deficiency (25(OH)D <50 nmol/l) were given 50,000 IU weekly dose of Vitamin D supplement for 8 weeks followed by 50,000 IU for every 2 weeks for another 8 weeks. Serum 25(OH)D and DBP levels were measured after 8 weeks again. Two common single nucleotide polymorphisms (rs4588 and rs7041) DBP were assessed using TaqMan genotyping system. **Results:** Significantly higher baseline 25(OH)D and DBP levels were found in individuals with rs7041-GG genotypes than GT and TT genotypes. Similarly, rs4588-CC genotype was significantly associated with higher 25(OH)D baseline 25(OH)D

levels. Furthermore, GCIS/S diplotype was significantly associated with higher 25(OH)D and DBP levels. The rs7041-GG and 4588-CC genotypes and GCIS/S diplotype are associated greater increased 25(OH)D levels after Vitamin D supplementation. **Conclusions:** The rs7041 and rs4588 variants in DBP are associated with baseline 25(OH)D levels and modify 25(OH)D response after Vitamin D supplementation in Saudi adults.

OC1.2. Validation of the Adapted for the Arabic Language Neuropathy-Foot Ulcer Specific Quality of Life Instrument

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Background: Diabetic peripheral neuropathy (DPN) affects the quality of life (QoL) of patients and should be assessed initially and in response to intervention. Neuropathy-specific QoL instruments have been neither adapted for the Arabic language nor validated to allow its use in clinical practice or interventional studies. Our objectives were to perform the adaptation of the Neuropathy- and Foot Ulcer (FU)-Specific QoL (NeuroQoL) instrument to the Arabic language and to test the reliability and validity of the Arabic version when used on patients with diabetes mellitus (DM) in the presence of DPN and FUs. **Methods:** The first step of the study included adaptation of the NeuroQoL instrument for the Arabic language. The second step included analysis of the responses of 50 Saudi patients with DM to the adapted NeuroQoL instrument and to the Arabic version of SF-36 instrument, through individual interviews. The NeuroQoL instrument included six domains: pain (P), loss/reduction in sensitivity (LS), diffuse sensory-motor symptoms (DSMS), limitations in daily activities (LDA), interpersonal problems (IP), and emotional distress (ED). Informed consent was obtained. The study protocol was approved by the Hospital's local Ethics committee. Confirmed generalized DPN was assessed using neuropathy symptom score (NSS), neuropathy disability score (NDS), nerve conduction studies, and electrochemical skin conductance (ESC). Pearson's correlation coefficient was used to test the relationship between variables. Cronbach's alpha was used to assess the reliability. Independent *t*-test was used to compare variables. SPSS version 20 was used for statistical analysis. **Results:** Mean age was 54.1 ± 8.9 years. History of FU was present in 56%. NSS was 7.16 ± 0.8 , and NDS was 7.94 ± 3.3 . Feet-ESC was $34.0 \pm 24.83 \mu\text{S}$. Mean NeuroQoL instrument score was 6.11 ± 2.7 . Cronbach's alpha values in the six domains of the NeuroQoL ranged from 0.645 for P to 0.924 for IP. Internal consistency of the items in each domain of the NeuroQoL assessed through Cronbach's alpha coefficient ranged from 0.71 to 0.98 and through Pearson's correlation coefficient ranged from 0.688** to 0.871**. There was a negative correlation between NeuroQoL instrument score and SF-36 instrument score: -0.670 ($P < 0.0001$). Convergent construct validity was verified through correlation among the six domains of the NeuroQoL scores and the physical and mental components (PC, MC) scores of the SF-36 and showed negative correlation for the PC ($P=0.411^\dagger$, $LS=0.612^{**}$, $DSMS=0.515^{**}$, $LDA=0.613^{**}$, $IP=0.694^{**}$, $ED=0.588^{**}$) and for the MC ($P=0.488^{**}$, $LS=0.665^{**}$, $DSMS=0.479^{**}$, $LDA=0.531^{**}$, $IP=0.666^{**}$, $ED=0.554^{**}$). Discriminant construct validity was verified through comparison of the means of the NeuroQoL instrument domains between patient groups without and with FU: P (5.25 ± 3.29 , $9.72 \pm 3.99 < 0.0001$), LS (5.2 ± 3.3 , $9.8 \pm 4.23 < 0.0001$), DSMS (5.0 ± 3.62 , $8.6 \pm 4.4 < 0.003$), LDA (5.48 ± 3.1 , $7.79 \pm 3.4 < 0.018$), IP (5.0 ± 3 , $8.4 \pm 3.3 <$

0.001 , and ED (5.6 ± 2.8 , $7.2 \pm 3.3 < 0.076$). **Conclusions:** Results of adaptation and validation show that NeuroQoL in the Arabic version has psychometric properties that allow its utilization as a valid and reliable instrument.

OC1.3. Euthyroid Athyroxinemia: A Novel Endocrine Syndrome

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Background: A 55-year-old female was referred with abnormal thyroid function tests (TFTs); the free thyroxine (FT4) level was undetectable $<3.3 \text{ pmol/L}$ (normal: $7.9\text{--}14.4$), while her free triiodothyronine (FT3), thyroid-stimulating hormone (TSH), and urinary iodine levels were normal. She was clinically euthyroid with a large soft-lobulated goiter that had been present for >30 years. **Methods and Results:** She received an injection of rhTSH following which there was a progressive rise of the FT3 and TSH levels to 23 pmol/L and $>100 \text{ mIU/L}$, respectively, at 24 h. The FT4, however, remained undetectable throughout. Being on thyroxine $100 \mu\text{g/day}$ for 1 month, her FT4 level increased to 15 pmol/L and TSH fell to 0.08 mIU/L . Four years earlier at another hospital, her FT4 level had been low (6.8 pmol/L) with a normal TSH and a raised Tc-99 uptake of 20% (normal $<4\%$). We checked the TFTs and Tc-99 scans in three of her children; one was completely normal and two had euthyroid with soft-lobulated goiters. Their Tc-99 scan uptakes were raised at 17% and 15%, with normal TFTs apart from a low FT4 7.2 pmol/L in the son with the largest thyroid nodule. **Conclusions:** This is a previously unreported form of dysthyronogenesis in which, with time, patients gradually lose their ability to synthesize T4 but not T3.

OC1.4. A Genotype-First Approach for Clinical and Genetic Evaluation of Wolcott–Rallison Syndrome in a Large Cohort of Iranian Patients with Neonatal Diabetes

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Background: Wolcott–Rallison syndrome (WRS) is an extremely rare autosomal recessive condition, characterized by permanent neonatal diabetes mellitus (PNDM) associated with skeletal dysplasia, growth retardation, and liver dysfunction. WRS is caused by biallelic mutations in the gene encoding eukaryotic translation initiation factor 2 alpha kinase 3 (EIF2AK3). **Methods:** As part of a comprehensive study on clinical and genetic investigation of neonatal diabetes in an Iranian population, 60 unrelated Iranian subjects referred with PNDM were analyzed. All the probands were screened for KCNJ11, INS, ABCC8, and EIF2AK3 using a polymerase chain reaction-based sequencing approach. **Results:** We identified nine different variants in EIF2AK3 in 11 unrelated Iranian probands, of which five variants were shown to be novel and not reported previously. The diagnosis of WRS was made by molecular genetic testing and confirmed by clinical reevaluation of the subjects. Clinical follow-up of the affected individuals shows that in at least some of them, PNDM was associated with short stature, failure to thrive, neurodevelopmental delay, epilepsy, and hepatic and renal dysfunction. There was a strong family history of neonatal diabetes in the families of the probands with a high mortality rate. **Conclusions:** WRS is a common cause of PNDM in children of

consanguineous parents. Furthermore, clinical diagnosis of WRS would have been delayed or possibly missed without genetic testing because this study shows that the associated features of WRS might be obscured by a diagnosis of PNDM. Therefore, EIF2AK3 should be considered for any infant and young child with PNDM, particularly if the parents are related.

OC1.5. Cabergoline-Induced Pneumocephalus after Treatment of Giant Invasive Macroprolactinoma Presenting with Spontaneous Cerebrospinal Fluid Rhinorrhea

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Background: Cerebrospinal fluid (CSF) rhinorrhea is very rarely reported as the first presenting feature for giant invasive macroprolactinomas. Spontaneous CSF leak is reported only in 2.6% of macroprolactinomas. Meanwhile, pneumocephalus is well-recognized complication posttranssphenoidal surgery for macroadenomas and more rarely postmedical therapy. **Methods:** We present two rare entities in the same patient with giant invasive macroprolactinoma who presented with spontaneous CSF leak and complicated by pneumocephalus after cabergoline treatment. **Results:** A 24-year-old male patient referred to our hospital with a history of a clear nasal discharge for 8 months before his presentation. Physical examination confirmed galactorrhea, gynecomastia, and absent facial and axillary hair and secondary sexual characteristics with normal visual field examination. Laboratory assessment revealed prolactin of 292,396 mIU/L, central hypothyroidism, hypogonadotropic hypogonadism, and growth hormone deficiency. Magnetic resonance imaging-pituitary confirmed giant macroadenoma measuring 5.5 cm × 4.4 cm × 5.2 cm. Five weeks after initiation of the treatment, he presented with severe headache for 2 days and computed tomography brain showed extensive pneumocephalus. He underwent skull base surgical repair and continued on cabergoline with a remarkable response as prolactin dropped to 314 mIU/L after few months. Invasive macroadenomas are associated with basal skull destruction, leading to cerebrospinal rhinorrhea and precipitate to development of pneumocephalus after tumor shrinkage due to the treatment. **Conclusions:** Spontaneous CSF rhinorrhea and pneumocephalus are unusual complications in giant invasive macroprolactinomas. A low threshold of suspension for these complications could help in early assessment and prompt management and prevent serious neurological sequelae.

OC2.1. Pheochromocytoma in Pregnancy: The Art of Balancing Risks for an Optimal Outcome

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Background: Pheochromocytoma in pregnancy is a rare, but serious disorder that can adversely affect obstetrical, maternal, and fetal outcomes with high maternal and fetal mortality. Diagnosis can be overlooked due to presentation heterogeneity and similarity to pregnancy-related disorders including preeclampsia and gestational hypertension. Gold standard treatment is with adrenalectomy preceded by adequate alpha-blockade and hydration. **Methods:** A 36-year-old female at 20th-week gestation was referred by a community midwife with hypertension. The

patient noted recent headache, dizziness, palpitations, tremors, anxiety, and difficulty gaining weight. Examination showed low body mass index (16 kg/m²), very high blood pressure (BP, 220/120 mmHg), and overt anxiety. No end-organ damage was noted. Suspicion of pheochromocytoma was confirmed with raised plasma normetanephrine >25,000pmol/L (normal: 120–1180) but with normal metanephrine 305 pmol/L (normal: 80–510). Magnetic resonance imaging abdomen demonstrated a 7.9-cm lipid-poor left adrenal mass. **Results:** Alpha-blockade was commenced with phenoxybenzamine 10 mg BD. Postural drop in BP was achieved but with significant tachycardia on minimal exertion (up to 140 bpm). Labetalol trial resulted in further drop in BP with no effect on tachycardia; it was therefore replaced by cardioselective bisoprolol. Daily intravenous hydration with 2–3 L Hartmann's was maintained. Gradual and cautious further uptitrations of phenoxybenzamine and bisoprolol were attempted achieving phenoxybenzamine 0.9 mg/kg and bisoprolol 85 mcg/kg daily preoperatively. She underwent successful laparoscopic left adrenalectomy at 22 weeks gestation with optimal outcome. Metanephrines and BP normalized postoperatively. **Conclusions:** High index of suspicion, early diagnosis, and management of pheochromocytoma are crucial for favorable outcomes. Adequate alpha-blockade in underweight pregnant patients is quite challenging and should only be carried out in tertiary care centers with multidisciplinary expertise.

OC2.2. Study the Reversibility of Beta-Cell Function in Patients with a History of Type 2 Diabetes for more than 7 years Who Attend an Endocrine Clinic for a Better Glycemic Control

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Background: Type 2 diabetes is described as a progressive loss of beta-cell function throughout the disease linearly with time, and after 10 years, more than 50% of individuals require insulin therapy. Overall, there is strong evidence that type 2 diabetes is inevitably progressive, with a high likelihood of insulin therapy being eventually required to maintain good glycemic control. **Methods:** A case study was done on 35 patients with type 2 diabetes (disease duration ≥7 years) who attend an endocrine clinic, and on multiple daily injections of insulin (MDI), with uncontrolled HbA1c of more than 7%, despite being on MDI at least three injections a day to control hyperglycemia. Their treatment was changed from a combination of long- and short-acting insulin to a glucagon-like peptide-1 (GLP-1), analog, sodium/glucose cotransporter 2 (SGLT2) inhibitors, and other oral medication plus basal insulin for better glycemic control. Their HbA1c and other parameters were compared in 6 months as a value for follow-up. **Results:** Patients who were on MDI with HbA1c ≥7% now have a better glycemic control after changing their medication. Of 35 patients, 18 showed decrease in their HbA1c (with an average reduction of 1.9%) and 13 35 patients still have no results because the 3 months duration did not pass since their last medication was changed. Of 35 patients, four showed increase in their HbA1c (an average increase of 0.275%) that we will explain later. **Conclusions:** Despite long duration of diabetes, GLP-1, SGLT2, and oral medications are good enough to improve HbA1c, help in weight reduction, and reduce number of injections and insulin units a day.

OC2.3. Duodenal Resurfacing Procedure: A Novel Approach for Type 2 Diabetes Management

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Background: Bariatric surgery has emerged as an effective intervention to treat obesity and its related comorbidities. For multitude of factors, access, insurance, patient fears, referrals, and the procedural risks, only 1% of the eligible undergoes bariatric surgery. Considerable needs for effective nonsurgical treatment modalities are mandated. The minimally invasive novel endoscopic therapies with less morbidity could be the answer for many morbidly obese patients. Researches advocate the important role of the foregut in the regulation of glucose homeostasis and diabetes. A novel purely endoscopic catheter-based procedure that targets the duodenal mucosa had been developed by Fractyl Laboratories targeting the abnormal hypertrophy and hyperplasia and the alterations in the enteroendocrine cells of the foregut usually seen in patients with diabetes. This minimally invasive Duodenal Mucosal Resurfacing (DMR) System is known as Revita. **Methods:** Revita involves two main steps: First, creation of a protective barrier by lifting the submucosal space of the duodenum with endoscopic injection of saline, and second, hydrothermal ablation (recirculation of hot water within a balloon-tipped catheter) of the circumferential duodenal mucosa. This rejuvenation of the lining of the duodenum will change gut signaling in patients with metabolic diseases caused by insulin resistance. The early results with Revita DMR are quite encouraging, with well-tolerated procedure; concerning safety, three instances of duodenal stenosis were reported and treated using endoscopic balloon dilation. **Results:** The first study involved 39 type 2 diabetes mellitus who were failing oral medications; at 6 months, the treatment had improved glycemic control, with significant decrease in fasting blood glucose, postprandial plasma glucose, and HbA1c. The patients receiving DMR on a long segment (average, $\frac{1}{4}$ 9.3 cm, $n_{\frac{1}{4}}$ 28) compared to short (average 3.4 cm, $n_{\frac{1}{4}}$ 11) of the duodenum experienced a greater reduction in HbA1c levels at 3 months and achieved a reduction in HbA1c levels from 8.5% to 7.1% at 6 months and about 5 pounds of weight loss. **Conclusions:** Further studies are necessary to understand the core mechanism, long-term safety, efficacy, durability, and how the procedure performs in a randomized clinical trial setting, while also embracing the potential for wider metabolic benefits.

OC2.4. The Effect of Vitamin D Replacement on Subclinical Hypothyroidism

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Background: Vitamin D deficiency has been linked to autoimmune thyroid diseases such as Hashimoto's thyroiditis; however, it is not clear if replacing Vitamin D would have an effect on thyroid function tests and thyroid autoimmunity. **Methods:** This was an observational, prospective study in a clinic setting that assessed the effect of Vitamin D3 replacement in Saudi patients with subclinical hypothyroidism (SCH) and Vitamin D deficiency. We measured TSH, Free T4, anti-TPO antibody titer, and Vitamin D levels at baseline and after 3 months of cholecalciferol replacement with 50,000 IU weekly. **Results:** The mean age of the participants was $39.1 \pm$ years, and 64.7% of the participants were females. The mean age of the

study population was 40.0 ± 1.8 years and 66.3% were females. The mean TSH was 6.1 ± 0.3 mIU/L, mean free T4 was 14.5 ± 0.2 pmol/L, mean anti-TPO antibody titer was 230.6 ± 96 IU/L, and mean Vitamin D level was 38.9 ± 3.6 nmol/L. Following 3 months of Vitamin D treatment, serum Vitamin D significantly increased to 59.6 ± 4.2 nmol/L, while TSH significantly reduced to 4.9 ± 0.26 mIU/L ($P = 0.001$). There was nonsignificant trend of a reduction in anti-TPO titer, which was reduced to 125.1 ± 58.2 IU/L, $P = 0.057$. There was a negative correlation between anti-TPO antibody level at baseline and baseline Vitamin D level, $r = -0.433$, $P = 0.034$. **Conclusions:** Replacing Vitamin D in subjects with autoimmune SCH and Vitamin D deficiency resulted in significant improvement of SCH as evidenced by a significant reduction in TSH and an improvement in thyroid autoimmunity after 3 months of replacement. A large, randomized, placebo-controlled, clinical trial is needed to reliably assess the effect of Vitamin D replacement on patients with SCH and Vitamin D deficiency.

OC2.5. Papillary Follicular Variant Thyroid Cancer in a Malignant Struma Ovarii: A Report of a Rare Case

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Background: A 35-year-old female, mother of four children, first presented in 2013 with left flank pain. She was found to have torsion of the left ovarian cyst. The ultrasound and magnetic resonance imaging (MRI) revealed a large complex mass $9 \text{ cm} \times 7 \text{ cm}$ arising from left ovary, which is suggestive of ovarian torsion due to the presence of the dermoid. She underwent a laparoscopic cystectomy, and the pathology revealed papillary/follicular carcinoma. The histopathology result was not seen at that time, and the patient lost follow-up. Three years later, she presented with abdominal distension. Ultrasound and computed tomography revealed a solid left ovarian mass with ascites and multiple peritoneal metastases. **Methods:** Her CA125 was found to be 1906 KIU/L (0.0–35), CA19-9 114 KIU/L (0.0–37), FT4 7.7 pmol/L (7–14), TSH 0.9 mIU/L (0.3–5), thyroglobulin (Tg) $>466 \text{ ug/L}$ (0.0–35). MRI pelvis revealed a malignant solid left adnexal mass with extensive peritoneal and mental implants with moderate ascites. She underwent total hysterectomy and bilateral salpingo-oophorectomy in November 2016. Histopathology revealed a malignant struma ovarii, well-differentiated thyroid carcinoma of ovarian origin with a feature of papillary, follicular variant, following which she had a total thyroidectomy in January 2017 and the histology was benign and was started on thyroxine suppression. Her repeated investigations following surgery showed normalization of CA125 14 KIU/L (0.0–35), CA199 40 KIU/L (0.0–37), FT4 12 pmol/L (7–14), TSH 0.23 mIU/L (0.3–5), and Tg 7 ug/L (0.0–35). Levothyroxine-T4 TSH-suppressive therapy and rhTSH-induced radioiodine ablation dose 5.3 GBq were performed on July 9, 2017, and the WBS scan showed only neck uptake and no distant disease in abdomen or other site. The plan is to book her for the WBS 1-131 scan after 6 months with a possible second ablation dose and do molecular analysis looking for BRAF, NRAS, KRAS, PIK3CA, and c-KIT mutations, which can indicate the disease severity. **Conclusions:** Malignant struma ovarii is a very rare disease and is the first case we have seen in more than 2000 thyroid cancer patients over the last 25 years. The management should be similar to that of metastatic thyroid cancer. The use of rhTSH avoids the side effects of hypothyroidism. Raised CA-125 levels do not necessarily indicate ovarian cancer.

Poster Presentations

P1001. Primary Hyperparathyroidism in Pregnancy: A Multicenter Case Series of Four Patients from Northern India

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Background: Primary hyperparathyroidism (PHPT) is the third most common endocrine disorder. PHPT in pregnancy is uncommon. Majority cases (85%) are due to single adenoma. The PHPT in pregnancy can negatively impact both mother and fetus. It may remain undiagnosed in majority of the patients. Early diagnosis and proper treatment have been shown to reduce complications significantly. Ultrasound neck is the first-line investigation during pregnancy to localize lesion. Minimally invasive parathyroidectomy (MIP) during the second trimester is the treatment of choice due to lower risk of complications. **Methods:** We present a series of four women, diagnosed to have PHPT in pregnancy. The data collected included presenting complaints, pre- and post-operative biochemical investigations, imaging, treatment opted, and patient outcome. **Results:** One patient presented during the first trimester, two during the second trimester, and one during the last trimester. All of them had symptoms such as body aches, vomiting, gait abnormalities, and pain abdomen due to acute pancreatitis and renal stones. There was no family history of multiple endocrine neoplasia in all patients. All of them had high serum calcium (>12 mg/dl) and parathyroid hormone (>760 pg/ml). All patients were managed with hydration for calciuresis and calcium-lowering agents such as calcitonin were used in two patients. Intravenous pamidronate was used in one patient as a desperate measure to control severe hypercalcemia. One patient died due to severe hypercalcemia and sepsis before surgery. The other three had single parathyroid adenoma localized by ultrasound as hypoechoic mass. The patients underwent MIP safely, two during the second trimester and one during the third trimester. Histopathology confirmed the diagnosis. Cure was achieved in all operated patients. **Conclusions:** This case series illustrates the importance of localization of parathyroid lesion by ultrasound neck and MIP as safe approach for pregnant women with PHPT. Screening of PHPT should be necessary for pregnant women with any clinical presentation associated with hypercalcemia.

P1002. Parathyroid Lipoadenoma: A Rare Variant of Primary Hyperparathyroidism

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Background: Parathyroid lipoadenoma, a rare and unusual variant of primary hyperparathyroidism (PHPT), consists of hyperfunctioning parathyroid cell nests in abundant fatty stroma. Its clinical features and laboratory investigations resemble that of usual parathyroid adenoma. Due to its bulky nature, it generally extends into the mediastinum. It is more common among middle-aged women and is not associated with multiple endocrine neoplasia or familial hyperparathyroidism. **Methods:** We present a rare case of a 34-year-old asymptomatic woman having PHPT due to parathyroid lipoadenoma. She was found to have mild hypercalcemia (10.9 mg/dl) and hypophosphatemia

(1.9 mg/dl) on routine investigations. Further evaluation showed high parathyroid hormone (PTH, 638.2 pg/ml), low Vitamin D (12 ng/ml), high 24-h urinary calcium (516.4 mg/dl), and normal renal and liver function tests. On examination, she had a large, soft mass palpable on the lower right side of the neck extending behind manubrium. ⁹⁹Tc-sestamibi scan was negative, ultrasonography and computed tomographic scan neck showed a soft-tissue mass lesion on the right lower neck extending into mediastinum. **Results:** On exploration, enlarged right inferior parathyroid gland embedded in a large fatty mass, extending behind carotid artery and jugular vein into mediastinum, was revealed. Right inferior parathyroidectomy with removal of fatty mass was done. The histopathology findings were suggestive of parathyroid lipoadenoma. It showed nodules and islands of parathyroid epithelial cells in a background of abundant lipomatous tissue, with intact capsule. The parathyroid epithelial cells were predominantly chief cells type with some acini formation at places. No feature suggestive of malignancy was seen. Postoperatively, PTH and serum calcium levels fell down to 187 pg/ml and 8.4 mg/dl, respectively. She is normocalcemic to date. **Conclusions:** We conclude that due to rarity of these lesions, parathyroid lipoadenoma is difficult to diagnose as a cause of PHPT and may be overlooked. Hence, knowledge of this entity is necessary to ensure that it does not get unnoticed as a cause of PHPT.

P1003. Tumor-Induced Osteomalacia: Rapid Reduction of Fibroblast Growth Factor-23 Levels Using Octreotide

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Background: A 40-year-old female presented with a 16-year history of progressive weakness and bone pains. Severe hypophosphatemia had been documented throughout and she had been treated intermittently with oral phosphate and various preparation of Vitamin D. Hypercalcaemia due to parathyroid hyperplasia was diagnosed 4 years earlier. In the last 2 years, she had undergone bilateral hip prostheses and removal of two hyperplastic parathyroid glands. When seen by us, she was bedbound with severe restriction of all joint movements. There was a palpable left buttock mass 4 cm × 4 cm. Tumor-induced osteomalacia (TIO) was suspected and confirmed by finding grossly elevated levels of fibroblast growth factor (FGF-23) 3400 Ru/ml (44–140). **Methods:** The serum calcium was 10 mg/dl (normal: 8.6–10.2), phosphate 0.93 mg/dl (normal: 2.5–4.49). Alkaline phosphatase (ALP) 400 U/L (normal: 35–104), parathyroid hormone (PTH) 27 pmol/L (normal: 1.6–9.3), and creatinine 70 umol/L (normal: 45–84). Octreotide scanning revealed focal uptake in the buttock corresponding to the MRI findings. Treatment with octreotide 100 mcg 8 hourly was given for 10 days before surgery. On day 3, the FGF-23 had fallen to 400, and on the day of surgery, it was 210 Ru/ml. A benign mesenchymal tumor was completely resected, and 8 weeks following surgery, the FGF-23 was 200 Ru/ml, serum calcium 10.8 mg/dl, serum phosphorus 2.01 mg/dl, ALP 690 U/L, PTH 22 pmol/L. The patient was then able to walk in a Zimmer frame. We propose to allow maximal bone healing to occur before reviewing her PTH status. The histopathology is consistent with benign mesenchymal tumor. Moreover, now, 3 months later, she is pain-free and walking with the crutch with serum calcium 9.8, phosphorus 2.3, ALP 540, and PTH 47. **Conclusions:** The report

describes a rare association between TIO and parathyroid hyperplasia. It demonstrates the value of octreotide scanning in tumor localization and indicates the potential for using LA octreotide therapy in patients with responsive tumors that cannot be localized or removed for any reason.

P1004. Neonatal Severe Hyperparathyroidism Secondary to a Novel Homozygous Calcium Sensing Receptor Gene Mutation

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Background: Neonatal severe hyperparathyroidism (NSHPT) is a rare autosomal recessive disease. Children present within the first 6 months of life and more commonly in the first few weeks. Common presentation is poor feeding, polyuria, dehydration, lethargy, failure to thrive, hypotonia, gastrointestinal dysmotility, osteopenia, and symptoms of respiratory distress due a poorly developed chest cage. **Methods:** We present a case of a 2-month-old female infant with severe hypercalcemia and hyperparathyroidism. The patient was treated with intravenous fluids, furosemide, calcitonin, intravenous pamidronate, and oral cinacalcet. She did not respond to medical treatment. Parathyroid gland imaging including ultrasound, magnetic resonance imaging, and sestamibi nuclear scan was not helpful in localizing the glands. Her symptoms resolved following total parathyroidectomy. She is being treated with alfacalcidol and calcium supplements to maintain normal serum calcium and phosphate. She achieved her normal developmental milestones. **Results:** She was found to have a novel homozygous mutation in the acceptor splicing site of intron 4 (c.1378-2A>G) of the calcium-sensing receptor gene (CASR). This mutation causes frameshift deletion of exon 5 and insensitivity of CASR to calcium. **Conclusions:** NSHPT can cause severe morbidity and mortality if the diagnosis is missed or treatment is delayed. Preoperative imaging is usually not helpful in localizing the parathyroid glands. Parathyroid surgery in children is challenging especially compared to parathyroid adenoma surgery which can be detected on preoperative imaging and easily identified preoperatively. NSHPT cases should be operated in centers with larger experience. Postoperative hypocalcemia can be managed with alfacalcidol or calcitriol and calcium supplements; kidneys are relatively protected due to decreased urinary calcium clearance.

P1005. Efficacy of Vitamin D3 over D2 in Vitamin D-Deficient and -Insufficient Patients in UAE: A Randomized Controlled Trial

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Background: Vitamin D exists in two main forms – cholecalciferol (Vitamin D3) and ergocalciferol (Vitamin D2). These are both prohormones and vitamins; it is questionable that which one is more efficacious. **Methods:** We conducted a randomized study involving 250 adults with Vitamin D deficiency or insufficiency, assigned into 1:1 ratio to receive weekly capsules of either 50,000

IU of D2 or 10,000 IU of D3 for up to 12 weeks; their total Vitamin D, Ca, phosphorus, alkaline phosphatase, and PTH levels were checked at 0, 8, and 12 weeks. **Results:** After 8 weeks of treatment, the improvement in Vitamin D level was greater for patients in the D3 group (mean [M] = 18.74, standard error [SE] = 1.08) than for D2 group (M = 5.88, SE = 0.65), $F(1, 240) = 113.840$, $P < 0.0005$. Similarly, after 12 weeks of treatment, the improvement in Vitamin D levels was greater for those in D3 group (M = 20.76, SE = 1.14) than for D2 group (M = 7.93, SE = 0.79), $F(1, 224) = 90.78$, $P < 0.0005$. After 12 weeks, there was no significant difference in the calcium levels between the D3 group (M = 0.013, SE = 0.099) and D2 group (M = 0.036, SE = 0.0695), $F(1, 68) = 0.026$, $P = 0.873$ or phosphorus levels between the D3 (M = 0.207, SE = 0.1435) and the D2 groups (M = 0.078, SE = 0.076), $F(1, 66) = 0.606$, $P = 0.439$ or in the parathyroid levels between the D3 (M = 1.91, SE = 2.38) and the D2 groups (M = 0.61, SE = 1.01), $F(1, 66) = 0.315$, $P = 0.576$ or in the alkaline phosphate levels between the D2 (M = -0.111, SE = 2.21) and the D3 groups (M = 2.86, SE = 2.32), $F(1, 66) = 0.433$, $P = 0.513$. **Conclusions:** Vitamin D3 is more efficacious in increasing the level of total Vitamin D as compared to Vitamin D2. However, it did not show any significant effect on calcium, phosphorus, alkaline phosphatase, or PTH levels.

P1006. When Autoimmunity Meets Iatros: Perils for the Unwary

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Background: A 27-year-old female with a 5-year history of Graves' Disease underwent subtotal thyroidectomy for the treatment of thyrotoxicosis. Within 24 h, she developed profound hypocalcemia requiring hospitalization for intravenous calcium administration. Despite this initial response to therapy, hypocalcemia condition persisted. **Methods:** Following hospital discharge, she developed further tetany with positive Trousseau sign and Chvostek sign and was admitted to the hospital for intravenous calcium administration. During the administration of intravenous calcium therapy, she developed a painful skin rash on the fingers of her right hand. This was biopsied and confirmed the clinical impression of cutaneous calciphylaxis. She was commenced on oral Vitamin D analogs and oral calcium supplements with limited clinical benefit. **Results:** During the period of unstable calcium control, she underwent serum testing and was found to have a very high titer of anti-TTG IgA consistent with celiac disease. She was placed on a gluten-free diet and her calcium management significantly improved. She underwent duodenal biopsy while taking gluten and the characteristic histological features of gluten-sensitive enteropathy were identified. She is now on a gluten-free diet and has stable serum calcium levels on minimal replacement therapy. **Conclusions:** Patients undergoing subtotal thyroidectomy are at risk of hypocalcemia. The risk is highest in those who are deficient in Vitamin D, are female, and have Graves' disease. In this group, we suggest preoperative Vitamin D testing and replacement if deficiency is found. In patients who have persistent hypocalcemia postoperatively, there is value in considering other autoimmune conditions that may result in impaired clinical responses to Vitamin D and calcium supplementation such as celiac disease.

P1007. A Rare Presentation of Primary Hyperparathyroidism in a Young Adult: A Case Report

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Background: Primary hyperparathyroidism is the unregulated overproduction of parathyroid hormone (PTH) resulting in abnormal calcium homeostasis. The hallmark of parathyroid hormone excess is increased osteoclastic activity with bone resorption. Cortical and trabecular bones are lost and replaced by loose connective tissue. In some instances, collections of osteoclasts, reactive giant cells, and hemorrhagic debris form a distinct mass, termed a brown tumor of hyperparathyroidism (osteitis fibrosa cystica). We present this case to emphasize the importance of early diagnosis and treatment of hypercalcemia due to primary hyperparathyroidism as a consequence of an undiagnosed parathyroid adenoma. **Methods:** We present a 24-year-old male with a history of recurrent renal stones and hypercalcemia which was not investigated previously. The patient presented with abdominal and left flank pain. Computed tomography abdomen was requested and incidentally revealed multiple lytic erosive lesions of the pelvic bones that were initially mistaken for soft-tissue metastatic lesions. However, further investigations confirmed the diagnosis of primary hyperparathyroidism based on elevated PTH and calcium levels and ultrasound neck reported a parathyroid adenoma that was removed surgically. **Results:** Osteitis fibrosa cystica (brown tumor) is a late and rare presentation of primary hyperparathyroidism, nowadays especially in developed countries. The improvement of resources utilization and routine biochemical screening tests results in early detection of hypercalcemia and diagnosis of hyperparathyroidism. **Conclusions:** Physician's awareness of unusual presentations and possible occurrence of lytic bone disease secondary to long-standing undiagnosed hyperparathyroidism are fundamental, and hence, the importance of careful history and physical examination was followed by a proper biochemical screening and thorough investigations whenever indicated. Early detection of this condition can lead to timely management, decreases irreversible complications, and improves survival.

P1008. Undiagnosed Primary Hyperparathyroidism in Pregnancy Resulting in a Life-Threatening Hypercalcemic Crisis and Uremic Encephalopathy

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Background: Primary hyperparathyroidism in pregnancy can be challenging to identify as the symptoms resemble those of common pregnancy disorders. If left untreated, maternal hypercalcemic crisis can be life-threatening and may even lead to death. It can develop early in the postpartum period due to the sudden interruption to calcium influx from the mother to the fetus with a 25% risk of perinatal mortality and 50% risk of neonatal tetany. **Methods:** A 30-year-old female who is in her 32nd week of gestation was admitted to the obstetrics ward with right-sided abdominal pain and repeated vomiting. She was found to have bilateral renal stones with right-sided obstructive uropathy needing nephrostomy. She had previous history of kidney stones before conception. She was delivered by cesarean section due to worsening kidney function and reduced stoma output. Four hours after delivery, she had grand mal seizures and hypotension,

where her calcium was found to be 3.2 mmol/L (normal range: 2.2–2.6). **Results:** Subsequent investigations confirmed a diagnosis of uremic encephalopathy and underlying primary hyperparathyroidism with parathyroid hormone level of 53 pmol/L (normal range: 1.0–6.4). She underwent total parathyroidectomy which confirmed the diagnosis of a benign parathyroid adenoma. **Conclusions:** During preconception and antenatal period, the detection of raised serum corrected calcium with a previous history of kidney stones should be followed by an endocrinology evaluation to rule out primary hyperparathyroidism. There is an important role of preconception care services to identify women with primary hyperparathyroidism as a definitive surgical management before conception might be crucial to prevent any adverse pregnancy, maternal, and fetal outcomes.

P1009. Vitamin D Deficiency Prevalence and Calcium Homeostasis in Children

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Background: Vitamin D deficiency (VDD) and insufficiency (VDI) are significant health problems all over the world. The aim of this study was to determine the prevalence of VDD in children residing in the Kingdom of Saudi Arabia (KSA) and to also investigate calcium homeostasis in these subjects. **Methods:** A cross-sectional study was conducted in 2110 participants aged between 6 and 15 years. Information on sociodemographic status, anthropometric measurements, knowledge about Vitamin D, color of the skin, dietary intake, sun exposure experience, smoking, and physical activity was collected through a questionnaire given to the parents of all subjects. The subjects were divided into three groups as VDD, VDI, and Vitamin D sufficient (VDS) according to their blood level of Vitamin D (VDD ≤ 25 nmol/L [25(OH)D], VDI >25 –50 nmol/L, and VDS >50 nmol/L). **Results:** VDD was highly prevalent in this group of children. 95.3 of the subjects had either VDD (45.5%) or VDI (49.9%). The prevalence rate of VDD combined with VDI was higher in females (97.8%) compared to males (92.8%) ($P < 0.001$). Only 1.6% had significant hypocalcemia. Children with dark skin had lower concentrations of Vitamin D and higher concentrations of parathyroid hormone. A positive correlation was observed between 25(OH)D level and serum calcium, inorganic phosphate, and alkaline phosphatase levels. **Conclusions:** The results showed a high prevalence of VDD and VDI in Saudi children with significantly higher prevalence in girls. These findings necessitate the setup of a national program for Vitamin D supplementation and health education for this vulnerable group.

P2001. Role of T-Helper Cells in Hepatic Virus C Patient with and without Type2 Diabetes Mellitus

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Background: The most common cause of hepatocellular injury is hepatitis C where a complex immunological mechanism responsible of it. The control of host resistance against hepatitis C is modulated

by both humoral and cell-mediated response. Cytokines play a major role in immunopathological defense against chronic hepatitis C. The T-cell activity either the cytotoxic or the helper is the responsible of the cell-mediated mechanism **Methods:** This study was conducted on three groups of subjects: Group I included 15 patients who were nondiabetics and positive for hepatitis C virus (HCV) antibody (Ab) by the third-generation ELISA; Group II included 15 patients who were diabetics and positive for HCV Ab by third-generation ELISA; Group III included 10 complete healthy normal subjects. All patients and controls were investigated for complete liver function tests, HbA1C, FPG, and HCV Ab by ELISA and serum IL-2 and IL-10 by ELISA technique **Results:** Our results revealed that there was a highly significant difference in the serum of IL-10 between Group I and Group II. **Conclusions:** A failure of the Th1 arm of the immune system with overactivity of the Th2 arm is implicated in the pathogenesis of viral hepatitis.

P2002. Does Vitamin D Status Correlate with Insulin Resistance in Obese Prediabetes Patients? An Egyptian Multicenter Study

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Background: The link between Vitamin D deficiency and type 2 diabetes (T2D) is one-way street and most common health problem all over the world. Since prediabetic obese populations have the greatest risk to develop to T2D in the presence of low concentrations of 25(OH)D, it was important in our study to examine serum 25(OH) D3 concentration among prediabetic obese patients and to study any correlation between serum level of Vitamin D and body mass index (BMI), fasting blood glucose (FBS), HOMA insulin resistance (IR), and glycosylated hemoglobin (HbA1c) among prediabetic patients. **Methods:** A case-control study was carried out among 101 prediabetics and 50 controls, after obtaining consent from subjects and clearance from institutional ethics committee. Serum Vitamin D level, plasma levels of HbA1c, and fasting insulin levels were measured by enzyme-linked immunosorbent assay (ELISA) in both groups enrolled in the study. **Results:** The prevalence of Vitamin D deficiency/insufficiency was (73.3%) ($n = 74$) among 101 individuals with obese prediabetes mellitus. Furthermore, a significant inverse correlation was observed between Vitamin D levels and BMI ($r = -0.28$, $P = 0.004$); fasting blood sugar ($r = -0.22$, $P = 0.002$); HOMA IR ($r = -0.25$, $P = 0.01$); HbA1C ($r = -0.2$, $P = 0.004$). **Conclusions:** High prevalence of Vitamin D deficiency or hypovitaminosis D exists among obese prediabetics, and there is significant inverse correlation between BMI, FBS, HOMA IR, HbA1c, and Vitamin D level.

P2003. Serum Retinol-binding Protein 4 as a Marker for Diabetic Nephropathy: Comparative Study between Diabetic Nephropathy Patients and First-Degree Diabetic Relatives

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Background: Insulin resistance and metabolic syndrome have become a global epidemic; identifying new intervention methods is important to prevent the disease. **Methods:** This study included 100 subjects, divided into five groups: Group I – 20 healthy lean control subjects, Group II – 20 healthy first-degree relatives of type 2 diabetic patients, Group III – 20 prediabetics, Group IV – 20 type 2 diabetics subdivided into 10 nonobese and 10 obese, and finally, Group V – 20 type 2 diabetics with nephropathy. All subjects were subjected to thorough clinical examination, fasting blood glucose, 2-h postprandial blood glucose, lipid profile, HbA1c, fasting serum insulin, urine examination for microalbuminuria, and estimation of serum retinol-binding protein 4 (RBP-4). **Results:** There were highly significant differences among the different groups regarding RBP-4 levels ($P < 0.001$). RBP-4 was higher in Group II than Group I ($P < 0.001$), while no significant difference was detected between Group II and Group IV ($P = 0.78$). On the other hand, RBP-4 was higher in Group V compared to Group IV ($P < 0.001$). Serum level of RBP-4 was highly correlated with systolic and diastolic blood pressure, body mass index ($P < 0.001$), fasting and 2-h postprandial blood glucose, fasting serum insulin ($P < 0.001$), and modest correlated with beta-cell function (HOMA-B) ($P < 0.05$) in all the studied groups. In addition, positive correlation was detected between serum RBP-4 level and serum triglycerides and cholesterol ($P < 0.001$) and low-density lipoprotein cholesterol ($P < 0.05$) while negative correlation was detected between RBP-4 and high-density lipoprotein cholesterol ($P < 0.05$). **Conclusions:** Serum RBP-4 can be used as a predictor for developing diabetic nephropathy and onset of diabetes in the first-degree relatives of diabetic patients.

P2004. Opportunities and Threats of Electronic Health in Management of Diabetes Mellitus: A Systematic Review of Review and Meta-Analysis Studies

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Background: To determine the role of e-health in the management of diabetes mellitus (DM). **Methods:** Systematic review (SR) and meta-analysis (MA) studies were searched systematically. **Results:** Eleven SRs and six MAs, including a total of 533 subarticles, were finally assessed. Six articles studied DM type 2 (DM2), two studies assessed DM1, five studies focused on both types of DM, and four studies included DM1, DM2, and gestational DM. In total, 38,641 from all ages were studied with a follow-up time from two phone calls to 60 months. As intervention, short message service, multimedia messaging service, telemonitoring, use of glucometer applications, and personal digital assistant were studied. Nine of 17 (53%) of studies showed significant reduction of HbA1c and eight (47%) studies revealed inconclusive effect on HbA1c. However, first group of studies was more powerful. Text messaging as reminders was more effective in improvement of DM patients. **Conclusions:** The majority of evidence show improvement of DM management using e-health. However, a fragile acceptance toward this issue exists. Therefore, future researches should focus more on using standard tools for assessment of e-health efficacy, patients' views, health-care providers' opinions, and cost-effectiveness of such interventions in the long term.

P2005. The Use of Glucose Sensor with Insulin Pump in Type 1 Diabetes Patients for Safe Fasting during Ramadan

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Background: Fasting Ramadan for type 1 diabetes patients could be a challenging for both patients and physicians due to complications such as hypoglycemia; hence, in this study, we chose to introduce glucose sensor as a safety option for type 1 diabetes patients who already on pump and willing to fast Ramadan for the first time. **Methods:** This is a pilot prospective cohort study. A total of six patients (four females and two males) with type 1 diabetes were recruited. Their mean age is 21.8 ± 2.2 years, diabetes duration is 11.1 ± 2.3 years, and mean duration on insulin pump is 4 ± 1.6 years. Insulin basal rates of infusion were reduced 5%–10% during fasting hours and increased between 5% and 10% after breaking fast. Weekly follow-up visits during Ramadan took place as well as a daily follow-up by phone with a diabetes educator. Patients were asked to wear glucose sensor for entire days of fasting to detect hypoglycemia. **Results:** A 28.8 ± 8.6 units for 24 h of basal insulin was set before fasting Ramadan, a 26.8 ± 7.5 units for 24 h of basal insulin was required for fasting Ramadan, and from that, 15.1 ± 4.3 units was basal insulin for total hours of fasting (14 h), part of it explained by food habits and lack of activity during Ramadan. An average of blood glucose was 11.1 ± 2.1 mmol/l 1 h before futoor, 9.7 ± 3.8 mmol/l 2 h after futoor, and 12.5 ± 3.4 mmol/l at suhoor. On the 1st week, four hypoglycemic episodes (blood glucose <3.9 mmol/l) due to correction dose within 1 h before futoor, so adjusting of basal insulin together instruction to patients not to take correction dose unless blood glucose above 13 mmol/l prevented further episode. **Conclusions:** The use of glucose sensor together with adjustment of basal insulin and close follow-up by physician and diabetes educator overcome the fear of hypoglycemia for type 1 diabetes patients fasting Ramadan.

P2006. A Comparative Study of Three Nonnutritive Sweeteners' Effects on Insulin and Glucose in Healthy Nondiabetic Adults

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Background: Nonnutritive sweeteners (NNSs) are sugar substitutes that provide the sweet taste with few or no calories. NNSs are widely used for weight management, dental caries prevention, and diabetic diets. The objective of this study is to assess the effects of NNS on blood glucose and insulin as compared to a glucose solution or placebo in healthy nondiabetic adults. **Methods:** Thirty-five Lebanese healthy, nondiabetic subjects aged 18–40 years with normal body mass index (18.5 – 24.9 kg/m²) were selected and divided into five groups with each group receiving a different solution. Group 1 received 9 g of Canderel®, Group 2 received 9 g of Nevella®, Group 3 received 9 g of Canderel Green Stevia®, Group 4 received 75 g of glucose, and Group 5 received only water. Serum glucose and insulin tests were performed fasting and 1 h postingestion of the solution. **Results:** No differences were observed between the genders ($P > 0.05$). The pre- and post-prandial blood glucose did not differ significantly between the three NNS groups and water ($P > 0.05$). Insulin levels increased postprandially in the Canderel® and glucose groups ($P < 0.05$) but not in the Nevella®, water, and Canderel Green Stevia® groups (P

> 0.05). **Conclusions:** There is a clear difference among the groups between the NNSs and glucose intake. Canderel® was the only NNS among the ones studied that caused a rise in insulin levels without any effect on blood glucose in the healthy subjects. Canderel® might not be the preferred NNS for type 2 diabetics due to the potential aggravation of the beta-cell dysfunction. Not all NNS are equal; physicians and nutritionists should be aware that some NNS on the market may worsen obesity, insulin resistance, and diabetic control.

P2007. Metabolic Effects of D-Chiro-Inositol plus Myo-Inositol in Polycystic Ovary Syndrome

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Background: Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women of reproductive age, affecting 6%–18% of them. The pathogenesis has not been fully deciphered. It results in insulin resistance (IR), menstrual irregularities, cardiovascular disease, obesity, and infertility. The use of D-chiro-inositol (DCI) in the treatment of IR in PCOS has been controversial with positive and negative data being published. Our objective is to evaluate the effect of DCI combined with myo-inositol (MI) on the metabolic outcomes of PCOS in a Lebanese women cohort. **Methods:** This is a prospective study of 150 Lebanese women diagnosed with PCOS and treated with Ovacure®. Patients were aged 13–55 years and were randomly selected from different clinics in Beirut and Mount Lebanon. A questionnaire covering the personal and health status, physical activity levels, medications, and anthropometrics was completed. Participants were treated with Ovacure® (DCI + MI + folic acid). **Results:** The prevalence of obesity in our population was 35.3%. IR occurred in obese and nonobese women with PCOS but was more prevalent in the obese population. After a 6-month course of treatment with Ovacure®, a significant decrease in fasting glucose, HOMA-IR, HbA1c, low-density lipoprotein, TG, weight, and BMI levels was noted. In addition, adding metformin to Ovacure® significantly lowered weight and BMI but not IR. **Conclusions:** In this study, we show that the combination of MI to DCI is effective in lowering glucose, IR, weight, and metabolic profile in PCOS. Furthermore, the addition of metformin may further help control overweight but not IR. Further studies may help uncover the effect of this combination on other PCOS complications such as infertility.

P2008. The Value of an Octreotide Trial in Adrenocorticotrophic Hormone-Dependent Cushing's Syndrome: A Case Report and Literature Review

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Background: A 21-year-old, presented with weight gain and amenorrhea of short duration taking 120 units of insulin and 10 mg amlodipine daily. She was severely Cushingoid with a palpable left breast mass 3.0 cm \times 2.5 cm. Blood pressure 160/97 mmHg, 0800 h cortisol 1200 nmol/L normal (normal: 185–624), 24-h urinary cortisol >4000 nmol/24 h (normal: 160–1112), 0800 h adrenocorticotrophic hormone (ACTH) 167 ng/L (normal: 7.2–63), potassium 3.0 mmol/L, and HbA1c 11% were noted. The pituitary magnetic resonance

imaging was normal. Ectopic disease was suspected and octreotide scanning revealed focal uptake in the right lung and left breast. **Methods:** A therapeutic trial of octreotide 100 mcg three times daily was given for 3 days, and the cortisol level fell from 1200 to 700 nmol/L. The dose was increased to 200 mg tid until surgery 12 days later. There was a dramatic clinical and biochemical response; amlodipine was stopped and the insulin dose reduced to 30 units a day. The serum cortisol fell progressively to 500 and later to 370 nmol/L on the day of surgery. One month after surgery, the serum cortisol was 310 nmol/L and the ACTH 6 ng/L. Insulin was stopped immediately after surgery. Histopathology revealed a benign lung carcinoid tumor positive for chromogranin A and ACTH. The breast tumor was a benign papilloma negative for ACTH. **Conclusions:** We recommend a 72 h trial of octreotide in patients with Cushing's syndrome and ACTH overproduction. Patients whose serum cortisol levels return to normal may then be controlled before surgery or in the long term with octreotide LA if surgery is not indicated.

P2009. Pregnant Women with Diabetes and Fasting of the Holy Month of Ramadan: A Service Review

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Background: Guidelines by several diabetes organizations recommend that women with diabetes during pregnancy should not fast during the Holy Month of Ramadan. In a joint obstetric and diabetes clinic, we aimed to evaluate the trend of pregnant women with diabetes for fasting the Holy Month of Ramadan, and their knowledge, against the advice provided by their healthcare providers. **Methods:** A total of 45 pregnant women with diabetes attending a joint antenatal diabetes clinic were directly interviewed by the use of a questionnaire. **Results:** Of 45 patients, there were 26 with gestational diabetes, 15 with type 2 diabetes, and four with type 1. All save one were performing self-monitoring of blood glucose. Ten were treated with diet, 18 with metformin, 10 with insulin, and seven with a combination of metformin and insulin regimen. Their average mean age was 31 years, with a mean parity of 4. Those who fasted were 29 against 16 who did not, and 18 patients had fasted before in other years. A total of 21 patients received counseling by their healthcare professionals. Of those who fasted, 37% (11 out of 29) did so against the advice, while 75% (12 out of 16) of those who did not fast followed the advice by their healthcare professionals. Only three patients had knowledge about the risk of ketoacidosis or hyperglycemia, and similar had knowledge about risk of hypoglycemia. Nine patients had knowledge about fasting and drug use, and only 14 patients indicated knowledge about adverse risk of fasting on the fetal well-being. **Conclusions:** Guidelines for the management of women with diabetes during pregnancy advise such women not to fast while pregnant as this may have. We have found that the majority of pregnant women with diabetes will follow the advice of their healthcare professionals, when given. Furthermore, the knowledge of these women of effect of fasting on negative implications for both mother and fetus appears to be very poor. Our review underscores the importance of patient education to safeguard favorable outcome of pregnancy in women with diabetes during Ramadan.

P2010. Changes in Glycemic Control, Biochemical, and Biophysical Profiles of Patients in the PROFAST Ramadan Study: A preliminary report

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Background: There are no clinical data on patients with type 2 diabetes (T2D) who use multiple and complex drug combinations while fasting the holy month of Ramadan. With the recent availability of new drugs to treat T2D, patients with multiple medications are increasingly seen in clinical practice. Current guidelines rely on expert opinion and advices are extrapolated from the pharmacodynamics of various antidiabetic agents. "PROspective Study of dose adjustment of multiple antidiabetic therapy for T2D patients FASTing the Month of Ramadan" (PROFAST Ramadan study) aims to assess the effect of dose adjustment of the antidiabetic agents on their glycemic profile during fasting. **Methods:** Patients with T2D who are taking three or more antidiabetes drugs and who satisfy the enrollment criteria were invited to participate in the study; which took place during Ramadan of H1438 (May–June 2017). A total of 228 patients of diverse ethnic backgrounds were enrolled from six different HMC outpatient clinical sites, Doha, Qatar. Preliminary data are available from 85 patients. The subjects intending fasting were counseled and medication doses were adjusted following the research protocol. Data (means + standard deviation) and significance were calculated using the Student's *t*-test or ANOVA as relevant. **Results:** There were 59 males and 26 females, aged 54 ± 9 years with diabetes duration of 10 ± 6 years. There was a nonsignificant trend toward improvement in glycemic control between pre- and post-Ramadan with HbA1c of $7.73\% \pm 0.92\%$ vs. $7.50\% \pm 0.95\%$ ($P = 0.14$), systolic and diastolic blood pressure (130 ± 17 vs. 127 ± 15 and 76 ± 15 vs. 75 ± 7 mmHg respectively, $P = 0.30$ and 0.70 , respectively); bodyweight did not change. However, there was a trend of worsening in total cholesterol and triglycerides, but no changes in high-density lipoprotein and low-density lipoprotein cholesterol. **Conclusions:** The preliminary data on the patients show a nonsignificant trend toward improvement of HbA1c, which suggest that the intervention before Ramadan, counseling and dose adjustment, may be useful for the patients intending fasting. However, the data did not reach significance but point to differential effects on glycemic control, biophysical, and biochemical variables. Large study numbers will provide more insight into this emerging major group of patients.

P2011. Hypoglycemia is Associated Mainly with Nonconventional use of Combined Antidiabetic Drugs in the PROFAST Study: A Preliminary Report

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Background: Patients with type 2 diabetes taking multiple drug combinations are more prone to develop hypoglycemia during fasting of the Holy Month of Ramadan. No studies to date have examined such patients, and the current guidelines rely on expert opinion and advise only extrapolated from the pharmacodynamics of various antidiabetic agents. PROspective Study of dose adjustment of multiple antidiabetic therapy for type 2 diabetic patients FASTing the Month of Ramadan (PROFAST Ramadan study) aims to assess the effect of dose adjustment of some antidiabetic agents on safe fasting. **Methods:** Patients with type 2 diabetes who were on three or more drugs for diabetes and who

satisfy certain enrollment criteria were invited to participate in the study which took place during Ramadan of H1438 (May–June 2017). A total of 228 patients of diverse ethnic backgrounds were enrolled from six different outpatient clinical sites of HMC, Qatar. Preliminary data are available from 85 patients. **Results:** There were 59 males and 26 females, and the total group mean age \pm standard deviation was 54 ± 9 years and diabetes duration of 10 ± 6 years. Nine patients developed hypoglycemia with an incidence of 10.5%. These patients were relatively younger (mean age: 48 years), with more tighter glycemic control (mean HbA1c of 6.5%), seven of them taking minimum of four medicines, and also seven on SGLT-2i, with equal sex distribution. **Conclusions:** Hypoglycemia could be relatively common in patients with type 2 diabetes who are taking multiple pharmacological agents during fasting of Ramadan. The concomitant use of SGLT-2i may act as a catalyst for increased risk of hypoglycemia in these patients. This group may require more meticulous review and careful adjustment of medications when counseled for fasting of Ramadan.

P2012. Diabetes Mellitus Awareness in Saudi Society

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Background: Many patients with diabetes mellitus (DM) only become aware of their disease once they have developed a life-threatening complication. Furthermore, the international reports revealed that Saudi individuals and health care providers remain either uninformed or unconvinced about the life-threatening complications of DM. Consequently, in this study, we aimed to focus on three objectives: to assess the general knowledge and awareness about DM in Saudi society; to compare the knowledge and awareness among Saudi health and nonhealth workers; and to compare the perceptions of Saudi society members regarding the best awareness strategies for promoting DM awareness. **Methods:** This 3-month study was conducted in Riyadh, Dammam, and Al-Qassim via hand-delivered and online (e-mail) questionnaires sent to participants. Data were entered manually into Microsoft Excel datasheets and analyzed using SPSS statistical software. **Results:** A total of 789 questionnaires were analyzed. Overall, 73.9% participants were male, and 89.0% were social media users. Only 37.3% of the participants were aware of the current DM prevalence in Saudi Arabia. Obesity and overweight were the most frequently identified risk factor for DM, followed by physical inactivity and family history. Amputation was the most frequently identified complication of DM, followed by eye complications, heart disease, kidney disease, and stroke. Regarding awareness, 80.5% and 57.9% of participants identified social media and educational curricula, respectively, as more effective for improving awareness. Most comparisons indicated significant differences, indicating better awareness among health workers. **Conclusions:** We identified a significant lack of knowledge and awareness about DM in Saudi society. Although health workers exhibited greater awareness, further improvement is needed to meet expectations. Both social media and educational curricula can improve and spread awareness of DM.

P2013. Healthcare Providers' Adherence to Diabetes and Safe Driving Recommendations

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Background: Chronic medical conditions such as diabetes, cardiovascular disease, cerebrovascular disease, and obstructive sleep apnea increase the risk for motor vehicle collisions. Most Middle East countries lack driver restrictions for those with chronic conditions, which likely affect their ability to drive. The aim of this study is to assess healthcare providers' adherence to recommendations for drivers with insulin-treated diabetes in Saudi Arabia. **Methods:** A cross-sectional study was conducted among healthcare providers (HCPs) working at several tertiary hospitals in Riyadh, Saudi Arabia, between April and December 2016, using a self-administered questionnaire. **Results:** We approached a total of 322 healthcare providers, with 285 participants completing the survey. Despite that the majority of HCPs (70.2%) were aware of the recommendations for safe driving in those with insulin-treated diabetes, adherence to the recommendations varied between 38.9% and 77.9%. Approximately half of them (51.6%) did not adhere to this advice; for example, their patients with diabetes are instructed to carry a glucose meter and check their blood glucose before driving and every 2 h while they are driving, 48.4% did not adhere to remind patients not to drive until 45 min after their blood glucose was normal, 47.7% were not advising insulin-treated patients with diabetes to not drive if their blood glucose level was 5.0 mmol/l or less, or if they felt hypoglycemic, 44.9% did not assess insulin-treated patient with diabetes if had hypoglycemia episodes while driving, and 31.9% did not advise their patients to stop the vehicle if hypoglycemia developed while driving. The most common risks recognized by our HCPs that typically led to driving mishaps were ignoring hypoglycemia (76.8%), poor education of the patient (74%), and previous hypoglycemia episodes while driving (74%). **Conclusions:** While most HCPs reported that they were aware of the recommendations, we found adherence problems with the recommendations. Action plans are aimed to improve safe driving recommendations, as required.

P2014. Type 1 Diabetes Mellitus in Saudi Arabia: Epidemiology, Risk Factors, and Healthcare Challenges

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Background: A series of studies have reported a continuous global increase in the prevalence and incidence of type 1 diabetes (T1D). However, compared with the developed countries, the research work conducted mainly on the incidence, prevalence, risk factors, and health care of T1D is woefully inadequate. In this study, we discuss the range of various aspects of T1D in Saudi Arabia from the published literature. **Methods:** A literature search was performed with the assistance of a senior researcher. The archives of the National Library of Medicine (PubMed) including the Ovid Medline databases were searched. General search engines were employed, and nonpeer-reviewed professional and specialist guidelines and workshops on T1D websites only in English and Arabic were also accessed. **Results:** Saudi Arabia has one of the world's highest annual incidence rates of T1D in children, with 31.4 new cases per 100,000 persons per year. Furthermore, Saudi Arabia has 16,100 children with T1D, by far the highest number in the Middle East and North Africa region, and over a quarter of the region's total of 60,700 T1D. Such figure ranks Saudi Arabia as seventh globally in terms of numbers and fifth in terms of incidence rate. Further, two studies also reported that the incidence of T1D in Saudi children 27.5/100,000 and 29/100,000 which are also high incidence rates in globally. Regarding the prevalence, a nationwide study projected

109/100,000, with marked difference between different regions. Importantly, the prevalence of celiac disease (5–7 times more prevalent than nondiabetes), higher distribution of anti-GAD, thyroid autoantibodies (anti-TPO and anti-TG), dental diseases, and low serum 25-hydroxy Vitamin D was found among the Saudi T1D. **Conclusions:** T1D prevalence and incidence seem to be growing higher in the Saudi population, posing a significant public health and considerable health care challenges in the country.

P2015. Assessment of Ramadan Education and Knowledge among Diabetic Patients

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Background: During Ramadan, Muslims fast from dawn until dusk for 1 lunar month every year. The majority of Muslim patients with diabetes are unaware of the potential complications that can occur while fasting, such as hypoglycemia. The aim of this study is to assess the level of patient education and patients' overall awareness of any possible complications that could occur while fasting during Ramadan and to determine how these patients deal with these complications. **Methods:** We conducted a cross-sectional study and surveyed diabetic patients about their diabetes-related knowledge over a period of 4 months from the outpatient clinic at the Obesity, Endocrine, and Metabolism Center at King Fahad Medical City. Patients were included if they aged ≥ 16 years and if they had been receiving treatment for at least 1 year before the study, irrespective of the medications used; the patients were also asked about the presence or absence of complications. **Results:** This study included 477 patients (325 females and 152 males). Most patients (297, 62.3%) had type 2 diabetes. The patients' mean age was 39.72 ± 15.29 years, and the mean duration of diabetes was 10.80 ± 5.88 years. During the past Ramadan, 76% of patients reported fasting, while 58% said that they monitored their blood glucose levels once per day. Hypoglycemic episodes were reported in 60.3% of type 2 diabetes cases and in 8.3% of type 1 diabetes cases. Among those who had hypoglycemia, 2.8% of patients with type 1 and 17.8% with type 2 diabetes broke their fast. Finally, 54% of patients reported that their healthcare providers offered them instructions on diabetes management during Ramadan. **Conclusions:** Ramadan health education in diabetes can encourage, improve, and guide patients to change their lifestyles during Ramadan while minimizing the risk of acute complications.

P2016. Development of Type 2 Diabetes Mellitus after Gestational Diabetes in a Group of Patients From a High-Risk Population: Proportion and Risk Factors

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Background: Many risk factors are known to predispose to type 2 diabetes mellitus (T2DM) development. Women who have a history of gestational diabetes mellitus (GDM) are particularly at high risk of developing T2DM later in their life. Up to 50% of patients with GDM will develop T2DM. This study aimed to assess the development and screening practice of T2DM in women with a history of GDM in a

large multilevel health care facility in Saudi Arabia. **Methods:** this was a cross-sectional study, which was conducted in the GDM clinic at King Abdulaziz Medical City in Riyadh (KAMC-R). KAMC-R is a tertiary care center associated with multiple primary health care facilities. A total of 123 women with a history of GDM between 2011 and 2014 were included in this study. Women who were diagnosed with T1DM or T2DM before gestation were excluded. Data were collected from medical records using a structured data collection form. The main outcome variable was development of T2DM. **Results:** of the 123 subjects, 82 (67%) patients developed T2DM based on follow-up and diabetes diagnostic tests. Forty-five patients out of 82 who developed T2DM did not have screening in the recommended period of 6 weeks to 6 months after delivery. Those who were older, had more pregnancies (more gravida and para), and with previous GDM were more likely to develop T2DM. **Conclusions:** GDM patients are known to be at increased risk to develop T2DM. The proportion of patients with GDM who developed T2DM in this study group is higher than what is reported in the literature. Most of the patients who developed diabetes later did not get screened in the recommended period of 6 weeks to 6 months. Improvement of screening practice for diabetes after GDM history and interventions are needed to reduce diabetes development.

P2017. Higher Rate of Hyperglycemia than Hypoglycemia during Ramadan Fasting in Patients with Uncontrolled Type 1 Diabetes: Insight from Continuous Glucose Monitoring System

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Background: Patients with uncontrolled type 1 diabetes mellitus (T1DM) are at the highest categories of risk group for Ramadan fasting and are exempt from fasting; however, majority of these patients will insist on fasting. The aim of the study is to evaluate the fluctuations of the glucose levels during Ramadan fasting in patients with uncontrolled T1DM. The secondary outcome is to assess the safety of fasting in these patients. **Methods:** Patients aged ≥ 16 years with uncontrolled T1DM ($HbA1c > 7\%$) from the Maternity and Children Hospital, Medina, Saudi Arabia, who insisted to fast during the month of Ramadan were asked to participate. A Medtronic RT-CGMS was applied to the participants for 3 days. **Results:** A total of 24 patients were agreed to participate in the study. All of them were women with a mean age of 22 ± 6 years, duration of diabetes 10.9 ± 7.2 years, and $HbA1c$ 9.3 ± 1.2 . All of the participants were on basal-bolus insulin regimen, except one being on insulin pump. There were no reported episodes of emergency room visits. Four patients broke their fast for mild hypoglycemia. Glucose profile typically followed a pattern that is characterized by an exaggerated rise in sensor glucose (SG) after iftar that sustained overnight with a second rapid rise in SG after suhoor with prolonged glucose decay over the daylight hours. Average SG was 11.3 ± 4.4 mmol/L, which was lower during fasting 10.5 ± 5.7 mmol/L than that during eating hours 11.8 ± 5.8 mmol/L ($P = 0.00$). There was a higher rate of hyperglycemia (48%) than hypoglycemia (10%). Hyperglycemia was observed in 53.3% during eating hours versus 44% during fasting hours ($P = 0.002$). **Conclusions:** Although it is generally assumed that there is a greater tendency for hypoglycemia during Ramadan fasting, we found a higher rate of hyperglycemia than hypoglycemia in patients with uncontrolled T1DM. Despite significant hyperglycemia, there were no major complications. Nonetheless, the long-term effects for the marked hyperglycemia during Ramadan are not known.

P2018. Is a Change in Paradigm in Investigation of Factious Hypoglycemia Necessary to Include Detection of Insulin Analogs?

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Background: Most of the present literature on evaluation of hypoglycemic disorders mentions various drugs, insulin secretagogues, and insulin as a cause of factious hypoglycemia and search for them in suspicious cases. Insulin analogs which are widely used nowadays and potential cause of factious hypoglycemia are not tested routinely because of nonavailability of specific immunoassays in commercial laboratories. The case reports highlight the importance of integrating insulin analog immunoassays in the evaluation of hypoglycemic disorders. **Methods:** We describe clinical, physical, and laboratory findings of three study patients without diabetes presented with persistent hypoglycemia and review the current relevant literature regarding methods of detection of suspicious factious use of insulin analogs as a cause of hypoglycemia. **Results:** Three adult nondiabetic patients were admitted and investigated for persistent hypoglycemia. All three denied taking any oral medications or insulin. The serum samples taken at the time of hypoglycemia showed low insulin and low C-peptide levels and negative sulfonylurea screening test. As insulin assay performed in most of the commercial laboratories can only detect human insulin but not the new insulin analogs which are widely used in the clinical practice, insulin analog detection and measurement done by appropriate immunoassay were requested. In all three cases, hyperinsulinemia due to insulin analogs was detected confirming factious administration of insulin analogs. **Conclusions:** Clinicians should be aware of insulin analogs as a potential cause of factious hypoglycemia, and suitable insulin immunoassays should be included in the algorithm of investigation hypoglycemic disorders to detect various insulin analogs for proper diagnosis and management.

P2019. Efficacy and Safety of Insulin Degludec/Liraglutide versus Basal-Bolus therapy in Patients with Type 2 Diabetes: DUAL VII Trial (NCT02420262) UAL VII Trial

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Objectives: We evaluated the efficacy and safety of insulin Degludec/Liraglutide (IDegLira) versus basal-bolus (BB) therapy in patients with type 2 diabetes (T2D). **Methods:** In a 26-week open-label trial, 506 patients (pts) with T2D uncontrolled on metformin and 20–50 units (U) insulin glargine U100 (IGlar) were randomized 1:1 to IDegLira or BB therapy (IGlar + insulin aspart up to 4 times a day). **Results:** Mean A1C decreased from 8.2% at baseline to 6.7% at end of trial in both arms; noninferiority (by <0.3%) for IDegLira was confirmed [$P < 0.0001$]. A similar proportion of pts achieved A1C targets with IDegLira versus BB (66.0% vs. 67.0% for <7%/49.6% vs. 44.6% for ≤6.5%, respectively). Total daily insulin dose was

lower for IDegLira (40.4 U) versus BB (84.1 U) ($P < 0.0001$). Body weight decreased with IDegLira and increased with BB ($P < 0.0001$); the rate of hypoglycemic episodes (HEs) was lower with IDegLira versus BB ($P < 0.0001$). More pts achieved a triple composite endpoint (A1C <7% with no HE in the last 12 weeks and no weight gain) with IDegLira versus BB (38.2% vs. 6.4%; odds ratio 10.39 [5.76; 18.75] $P < 0.0001$). Mean pre- to post-prandial plasma glucose increment decreased more with BB versus IDegLira ($P = 0.0032$). SF-36 (mental component summary) and TRIM-D (total scores) improved more with IDegLira versus BB ($P = 0.0074$ and $P < 0.0001$, respectively). Adverse event rates were similar. **Conclusions:** In pts with A1C >7% on metformin and IGlar, IDegLira versus BB resulted in similar A1C reductions, lower insulin dose, weight loss, and lower risk of HEs.

P2020. Cerebral Edema during Diabetic Ketoacidosis in a Pediatric Female Patient

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Background: Cerebral edema is a leading cause of mortality in diabetic ketoacidosis (DKA) ranging from 25% to 50%, it occurs in around 1% of DKA cases.^[1] We present a case of a young girl with type 1 diabetes who developed cerebral edema during a course of treatment for DKA. **Methods:** A 14-year-old female child with type 1 diabetes for about 5 years on basal-bolus regimen admitted with a history of abdominal pain and vomiting after missing insulin dose. Her vitals were stable on admission with normal sensorium. She was found to be have elevated capillary blood sugar, ketonuria, and mild acidosis (pH: 7.2) with serum sodium of 128 mmol/l, bicarbonate of 16.4, and potassium of 3.7 mmol/l. She had normal urea and creatinine values with negative septic markers and normal chest Xray. She was started on standard DKA protocol with intravenous fluids and insulin infusion. Five hours later, she was found to be drowsy with headache but continued to maintain normal vitals and her metabolic parameters were improving. Computed tomographic scan was done on urgent basis which revealed cerebral edema. **Results:** This patient was started on intravenous mannitol along with decreased rate of fluid administration in view of new-onset cerebral edema. The patient showed good response. She subsequently came out of the ketoacidosis and was discharged with full recovery and no residual neurological deficit. **Conclusions:** Many studies have been done to figure out risks factors but unfortunately most these studies were either low or moderate quality. Most agreed on elevated high blood urea nitrogen and low partial pressure of carbon dioxide as precipitating factors.^[2] Fluid volume and rate have not been conclusively associated with such risk in majority of studies. We highlight this case to emphasize the need for close neurological monitoring in all pediatric DKA patients. As required by the clinical scenario, the rate and volume of fluid administration need to be reviewed although there is currently no conclusive evidence for their association with the development of cerebral edema in cases of DKA.^[3] Large randomized case-controlled studies on this aspect would be needed to yield a clearer consensus on the etiopathogenesis of cerebral edema in pediatric patients who develop DKA.

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P2021. Converting to Insulin Degludec/Liraglutide is Efficacious regardless of Pretrial Insulin Dose in Patients with Type 2 Diabetes Uncontrolled on Insulin Glargine U100

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Background: Converting to insulin degludec/liraglutide (IDegLira) is efficacious regardless of pretrial insulin dose in patients with type 2 diabetes (T2D) uncontrolled on insulin glargine U100 (IGlar). **Methods:** This *post hoc* analysis of DUAL V investigated the safety and efficacy of initiating IDegLira once daily at 16 units (U) (16 U IDeg; 0.58 mg liraglutide) in adults with T2D uncontrolled on 20–50 U IGlar, versus continued IGlar uptitration, across pretrial daily insulin dose groups. **Results:** With IDegLira, A1C reductions from baseline to end of trial (EOT, week 26) were significantly greater versus IGlar for all dose groups. Compared with IGlar, IDegLira was insulin sparing and resulted in body weight loss versus body weight gain and lower rates of hypoglycemia, for all dose groups ($P < 0.05$, all treatment contrasts). There were no clinically significant increases in self-measured plasma glucose levels when converting from any dose group to 16 U IDegLira and no withdrawals due to hyperglycemia with IDegLira in first 8 weeks. Fasting plasma glucose reductions were similar between treatment arms for all dose groups. For all endpoints except EOT insulin dose, treatment effect was consistent across dose groups. **Conclusions:** Regardless of pretrial dose group, IDegLira resulted in significantly greater A1C and body weight reductions and lower hypoglycemia rates versus IGlar at a lower EOT insulin dose and importantly, with no loss of glycemic control when converting from any dose between 20 and 50 U of IGlar to the starting dose of 16 U IDegLira.

P2022. Hyperglycemic Hyperosmolar Syndrome in a 5-Year-Old Girl

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Background: Hyperglycemic hyperosmolar syndrome (HHS) is a life-threatening condition with high morbidity and mortality rates. It is commonly used to be seen in adults with type 2 diabetes mellitus (T2DM). However, reported HHS cases in pediatric population worldwide had been increased due to increasing incidence of obesity and T2DM in this population. We report here one of the youngest aged children presenting with HHS in newly T2DM. **Methods:** patient's information obtained on reviewing her medical electronic chart. **Results:** Our patient is a 5-year-old Sudanese female child with a history of morbid obesity and panhypopituitarism secondary

to a surgical resection of craniopharyngioma and radiotherapy at the age of 3.5 years. She developed diabetes insipidus, hypothyroidism, and glucocorticoid deficiency. She was maintained on steroids (8.5 mg/m²/day), levothyroxine, and desmopressin. She presented to the emergency department with a history of decreased activity, headache, and drowsiness for 1-day duration. On examination, she had been found to have a compensated shock with moderate dehydration. She had acanthosis nigricans as well with BMI 35 kg/m² (>97th percentile). Her laboratory investigations showed a picture of HHS and acute renal impairment due to the dehydration. Once started on fluids followed by insulin, she had been clinically improved. Her follow-up laboratories later confirmed the T2DM diagnosis. **Conclusions:** We report a 5-year-old female child with HHS and newly diagnosed T2DM, which consider it to be one of the youngest aged children to present with HHS in a T2DM. This should alert us that HHS could happen at any age and it should be suspected whenever the patient has the criteria of diagnosis for early aggressive management to avoid the morbidity and mortality of this syndrome.

P2023. Screening Tests for the Diagnosis of Distal Symmetrical Polyneuropathy in Type 2 Diabetes Mellitus: Results from a Cross-Sectional Study in South Asian Patients

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Background: The World Health Organization has estimated that the developing world would bear an increasingly larger burden of diabetes in the near future. South Asia, in particular, is considered one of the areas of highest increase in projected numbers. The most common presentation of diabetic neuropathy is distal symmetrical polyneuropathy (DSPN) which accounts for 50% of neuropathies associated with diabetes. In the present study, we aimed to evaluate the effectiveness of two bedside tests (VibraTip and Neuropad) as screening tests to diagnose DSPN in South Asian male patients with type 2 diabetes mellitus (T2D). **Methods:** There were 60 male and 60 female patients who met the inclusion criteria. Each patient had glycemic control parameters, lipid profile, and renal function assessed. DSPN was defined by a Michigan Neuropathy Screening Instrument (MNSI) clinical score >2. Patients were divided into two groups: subjects with clinical DSPN (MNSI >2) and subjects without DSPN (MNSI ≤2). All patients had both Vibratip tests and Neuropad tests applied. Statistical analyses were conducted using the SPSS software (V.21) and data were presented as means ± standard deviation (SD). A student's *t*-test was used to compare the means of important variables in both groups and Chi-square test to compare proportions between groups. Measures of diagnostic performance (sensitivity, specificity, and negative predictive value [NPV] and positive predictive values) were also calculated. **Results:** The prevalence of DSPN determined clinically by MNSI was 35.8%. DSPN in these patients was associated with age, worsening renal function, and insulin treatment. The Vibratip test exhibited a sensitivity of 52.1% and specificity of 93.3%, with an NPV of 87.1%. The sensitivity and specificity of the Neuropad test for DSPN was 62.6% and 68%, respectively. Its NPV was 84.6%. **Conclusions:** Both the Neuropad and Vibratip tools show considerable diagnostic power for DSPN in South Asians. However, further studies regarding the cost-effectiveness of these tools in clinical practice are needed.

P2024. Self-Rated Questionnaires for Diabetes: A Systematic Evaluation

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Background: Assessing patients' adherence to lifestyle recommendations and the impact of diabetes on their lives can guide clinicians toward appropriate management choices. We aimed to evaluate the published self-rated questionnaires for patients with diabetes mellitus. **Methods:** research ethics approval was obtained from the Al Ain Medical District Human Research Ethics Committee before the start of the research study. An online search was conducted using Google Scholar with the keywords "diabetes questionnaire." Search results were reviewed for relevant articles based on criteria including the presence of psychometric data. **Results:** Outlines the findings including characteristics of various self-rated diabetes questionnaires. While all the questionnaires aimed to evaluate patient's adherence and adjustment to diabetes, the approaches taken were quite varied. Some used patient's recall of specific behaviors over a period such as the last 7 days. Other questionnaires asked patients to perform normative self-evaluation ("eat the correct food portions" or "treat low blood glucose with just the recommended amount of carbohydrate"). Outdated recommendations were present occasionally such as checking for ketones. Some items were not universally applicable such as keeping food records. Other items were specific to a country such as wearing a "medic alert id." Several questionnaires had items for type 1 diabetes included. Psychometric properties were tested but not validated robustly. Questionnaires were frequently revised and updated after the initial validation study. Thus, the validation data and correlations with HbA1c and clinical outcomes were not applicable to the current versions. Indeed, some authors suggested that users change the wording of the items and drop or add new items as needed. **Conclusions:** A range of self-rated questionnaires are available for evaluating adherence and adjustment among patients with diabetes. The applicability, reliability, and relevance to specific regions should guide adopt a particular questionnaire.

P2025. Clinical Effectiveness of Sodium/Glucose-Cotransporter 2 Inhibitors in Patients with Type 2 Diabetes Mellitus: "Local Experience"

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Background: Sodium/glucose-cotransporter 2 (SGLT2) inhibitors are novel classes of drugs with a unique mechanism of action that can help patients with diabetes achieve target glycemic control. A retrospective study (local experience) was conducted to assess the clinical effectiveness and safety of SGLT2 inhibitors as monotherapy or in combination with other oral hypoglycemic agents and or insulin therapy. **Methods:** This was a retrospective study to collect data from outpatient diabetes clinic over a 3-month period from October 2016 to December 2016. Patients with type 2 diabetes mellitus (DM) on SGLT2 inhibitors were all included in the study and looked at their weight, BMI, BP, HBA1C, total cholesterol, low-density lipoprotein (LDL) cholesterol, and creatinine before and after commencing SGLT2 inhibitors. Patients should have been on SGLT2I for at least 4 weeks. **Results:** Forty-two patients with type 2 DM on SGLT2I included in the study, 24 patients on dapagliflozin, 11 patients on

canagliflozin, and seven patients on empagliflozin. There were 29 males and 13 females and their average age was 48 years. Their average weight reduced by 2 kg from 88.8 to 86.8 kg, and their BMI improved from 31.5 to 30.5. SGLT2 inhibitors significantly reduced both systolic and diastolic BP, the average BP before commencing SGLT2I was 130/79 and after treatment was 121/74. There was significant reduction in HBA1C, the average HBA1C of 8.4% reduced to 7.2%. Total cholesterol also improved from 5 to 4.2 mmol/l, but there was no significant reduction in LDL cholesterol 2.9 mmol/l compared to 2.3 mmol/l. Serum creatinine remained stable after starting SGLT2I. Only one patient developed uncomplicated UTI while on SGLT2I. **Conclusions:** This local retrospective study showed that SGLT2 inhibitors are safe, well tolerated, and clinically effective in improving the glycemic and metabolic control of patients with type 2 DM. There was no significant reduction in LDL cholesterol compared to total cholesterol.

P2026. Within-Day Variability Based on Nine-Point Profiles Correlates with Risk of Overall and Nocturnal Hypoglycemia in Adults with Type 1 and Type 2 Diabetes

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Background: Higher glycemic variability has previously been linked to an increased risk of hypoglycemia. **Methods:** The correlation between within-day variability, based on nine-point profiles, and hypoglycemia was investigated in two double-blind, treat-to-target, crossover trials comparing insulin degludec once daily (OD) with insulin glargine U100 OD in adults with type 1 diabetes (T1D) (SWITCH 1, $n = 501$) or insulin-experienced adults with T2D (SWITCH 2, $n = 721$). Within-day glycemic variability was calculated as the relative fluctuation of the nine-point profile, defined through the integrated absolute distance from the mean within-day variability. Variabilities were subsequently categorized into low, medium, and high tertiles based on the geometric mean. Hypoglycemia was defined as overall symptomatic (severe or blood glucose [<56 mg/dL] confirmed), nocturnal symptomatic (00:01–05:59), and severe (requiring third-party assistance and confirmed by a blinded adjudication committee) events. **Results:** This analysis showed that an increase in within-day variability has a significant correlation with an increasing risk of overall and nocturnal hypoglycemia. However, no correlation was found for severe hypoglycemia in this dataset. **Conclusions:** Within-day glycemic variability is associated with a risk of overall and nocturnal hypoglycemia.

P2027. HbA1c Response to Open-label Empagliflozin with Metformin in Patients with Type 2 Diabetes

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Background: We investigated HbA1c response to open-label empagliflozin (OL EMPA) plus metformin (MET) in patients with type 2 diabetes mellitus (T2DM) in two Phase III trials. Patients with HbA1c $\geq 8.0\%$ – $\leq 10.5\%$ on stable-dose MET received OL EMPA 10 or 25 mg for 16 weeks, after which patients with HbA1c $\geq 7.0\%$ – $\leq 10.5\%$ were randomized double-blind to a combination of linagliptin and EMPA (10 or 25 mg) or placebo plus EMPA (10 or 25 mg), all added to stable-dose MET. **Methods:** In total, 344 and 334 patients, respectively, received ≥ 1 dose of OL EMPA 10 or 25 mg and had HbA1c values before and during OL treatment. In the EMPA 10 and 25 mg groups, pretreatment mean (standard deviation [SD]) HbA1c levels (%) were 8.91 (0.79) and 8.96 (0.80) and mean (SD) changes at the end of the OL period (week 16) were -1.12 (1.08) and -1.42 (0.94), respectively. **Results:** At week 16, 72% and 66% of patients in the EMPA 10 and 25 mg groups, respectively, had HbA1c $\geq 7.0\%$ – $\leq 10.5\%$ and were included in the double-blind treatment analysis set; mean (SD) changes from pretreatment in these groups were -0.89 (0.97)% and -1.20 (0.87)%, respectively. At week 16, 19% and 25% of patients reached HbA1c $< 7.0\%$ with EMPA 10 and 25 mg; mean (SD) changes from pretreatment in these groups were -2.12 (0.76)% and -2.10 (0.78)%, respectively. **Conclusions:** from a baseline of $\sim 9\%$, OL EMPA added to MET reduced HbA1c by approximately 1% at week 16. One in five patients reached HbA1c $< 7.0\%$ (mean 6.5%), with a mean reduction of $\sim 2.1\%$. Predictors of HbA1c response to EMPA require further analysis.

P2028. Pro BNP Level Is Associated with Prevalence, Grade, and Number of Microvascular Complications in Patients with Type 2 Diabetes Mellitus with or without Congestive Heart Failure, Ischemic Heart Disease, and Chronic Kidney Disease

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Background: Pro BNP has been a marker of acute congestive heart failure (CHF) and cardiovascular (CV) risk. There is a rising interest in its association to the microvascular complications of type 2 diabetes. In this study, we investigated the relation of pro-BNP to microvascular complications and CV risks in patients with type 2 diabetes. **Methods:** This was a cross-sectional study of 236 patients with type 2 diabetes mellitus who were divided into two groups: Group A ($n = 144$) patients with pro BNP less than 100 pg/ml and Group B ($n = 92$) patients with pro BNP more than 100 pg/ml and/or ischemic heart disease (IHD), CHF, and creatinine more than 2 mg/dl. **Results:** Means of age, ACR, CV risk, SBP, and number of microvascular complications were significantly higher in patients of Group B than Group A. The prevalence of neuropathy was significantly more in patients of Group B than Group A ($P = 0.031$). Patients in Group B showed a significant increase in incidence of retinopathy in each of its four grades ($P = 0.008$). Age significantly positively correlated to the pro BNP in both Groups A and B ($P = 0.001$, 0.030 , $B = 0.266$, 0.226). CrCl ($P = 0.036$, $B = -0.179$), HOMA IR ($P = 0.017$, $B = -0.205$), TG ($P = 0.025$, $B = -0.187$), microalbuminuria grade ($P = 0.012$, $B = -0.229$), significantly negatively correlated with pro BNP level in Group A only. Total cholesterol ($P = 0.043$, 0.009 , $B = -0.169$, -0.275) and low-density lipoprotein ($P = 0.041$, 0.028 , $B = -0.170$, -0.232) significantly negatively correlation to pro BNP in both groups. high-density lipoprotein significantly negatively correlated to the pro-BNP in Group B only ($P = 0.009$, $B = -0.273$). Uric acid significantly

positively correlated to the pro-BNP in Group B ($P = 0.01$, $B = 0.2642$). **Conclusions:** Pro BNP significantly correlated with the prevalence, degree, and number of microvascular complications in patients with type 2 diabetes.

P2029. Extremely Low Serum Bicarbonate with Severe Acidosis in a Case of Diabetic Ketoacidosis

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Background: Diabetic ketoacidosis is a common yet serious complication of diabetes. Metabolic acidosis is an integral part of the derangement that occurs in diabetic ketoacidosis and can be a life-threatening event. We present a case of severe diabetic ketoacidosis with extremely low levels of serum bicarbonate which is one of lowest readings noted in medical literature. **Methods:** A 48-year-old woman with type 2 diabetes on insulin presented with 1-day history of dizziness and vomiting and had been off her regular insulin for 1 week. She was drowsy at the time of admission but maintained normal vitals. Initial glucose readings were above 800 mg and urine was positive for ketones. ABG showed a pH of 6.76 with bicarbonate readings of 1.7 mmol at the time of presentation. Blood and urine cultures were negative and chest X-ray was normal. Septic workup was negative and there was mild renal impairment with creatinine of 1.3 mmol/l. The patient was admitted as a case of diabetic ketoacidosis with severe metabolic acidosis and started on standard diabetic ketoacidosis protocol with intravenous fluids and insulin infusions along with intravenous bicarbonate. **Results:** Patient improved with normalization of her level of consciousness and return of metabolic parameters including return of blood pH and bicarbonate levels to the normal range. Diabetic ketoacidosis protocol was subsequently stopped and patient discharged on mixed insulin preparations. **Conclusions:** This patient had presented with severe metabolic acidosis and very low levels of serum bicarbonate. We did an extensive literature search on severe diabetic ketoacidosis. Rodríguez-Gutiérrez *et al.*^[1] had described studies of diabetic ketoacidosis with average pH of < 6.9 and average bicarbonate levels of around 3.65. In a study by Chua *et al.*^[2] looking at various studies of severe diabetic ketoacidosis, they mentioned a study by Kamarzaman *et al.*^[3] in which a blood pH of 6.27 and a bicarbonate of 4 mmol/l was documented. A study by Okada *et al.*^[4] had reported blood pH levels of 6.98 but with serum bicarbonate levels of as low as 2 mmol/l. Despite our searches, we were unable to find any documentation of cases of diabetic ketoacidosis with bicarbonate lower than 2 mmol/l. We believe that this case of severe diabetic ketoacidosis has presented with one of the lowest values of blood bicarbonate documented.

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P2030. CARMELINA® Trial Baseline Characteristics: A Cardiovascular and Renal Microvascular Outcome Trial with Linagliptin in Patients with Type 2 Diabetes at High Vascular Risk

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Background: Recent cardiovascular (CV) outcome trials in type 2 diabetes (T2D) focused on populations at high risk for macrovascular complications. Generally, patients with moderate-to-severe microvascular burden, such as advanced kidney disease, were relatively underrepresented. Thus, the impact of glucose-lowering therapies on combined cardiorenal outcomes in T2D remains unclear. **Methods:** CARMELINA® (NCT01897532) is an ongoing, global, randomized, double-blind, placebo-controlled clinical trial designed to assess the impact of the DPP-4 inhibitor linagliptin 5 mg daily on CV and renal outcomes in a population enriched for both macrovascular and renal microvascular complications. The primary objective is to establish CV safety of linagliptin versus standard of care assessed by a composite outcome of three-point MACE (CV death, nonfatal myocardial infarction, or nonfatal stroke). A composite renal outcome (renal death, end-stage renal disease, or sustained $\geq 40\%$ decrease in estimated glomerular filtration rate [eGFR] from baseline) is a prespecified secondary endpoint and will be tested after noninferiority for MACE is established. All CV and renal outcome events will be confirmed by central adjudication. **Results:** Baseline characteristics of the treated study population ($n = 6980$) randomized between July 2013 and August 2016 include (mean \pm standard deviation) age 65.8 ± 9.1 years, 62.9% male, BMI 31.3 ± 5.3 kg/m², and HbA1c $7.9 \pm 1.0\%$. Most patients had long-standing T2D (64.7% > 10 years) and 57.9% were treated with insulin. As defined by the study inclusion criteria, established CV disease ($n = 3990$ [57.2%]), prevalent CKD (i.e., GFR < 60 ml/min/1.73 m² or macroalbuminuria; $n = 5148$ [73.8%]), or presence of micro- ($n = 2896$ [41.5%]) or macro-albuminuria ($n = 2691$ [38.6%]) were frequent at baseline. **Conclusions:** CARMELINA® is an ongoing trial and will explore both CV and renal outcomes in patients with T2D. In addition, it will add evidence to the long-term clinical safety profile of linagliptin by including patients at advanced stages of kidney disease. Results are expected by 2018.

P2031. Use Dapagliflozin in a Renal Transplant Recipient: A Case Report and Survey of Physicians Perceptions in an Evidence-Free Zone

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Background: Diabetes is the leading cause for end-stage renal disease (ESRD) worldwide. Renal transplantation is eventually for

a proportion of patients with ESRD. On the other hand, diabetes is also highly prevalent in kidney-transplant recipients for nondiabetic reasons. Risk factors associated with the development of diabetes include the use of diabetogenic immunosuppressive medications (particularly glucocorticoids), hypomagnesemia, and posttransplant weight gain. Management of hyperglycemia in ESRD can be a challenging task with opposing forces, leading to hypo- and hyperglycemia coupled limitations imposed on the many antidiabetic medications. **Methods:** This study design was combination of (1) index case report, (2) survey of physicians' opinions, and (3) review of the literature. **Results: case Report:** A 58-year-old Arab Emirati retired police officer was seen at the diabetes clinic in October 2015, having been transferred from another physician's list due his relocation elsewhere. His medical history includes type 2 diabetes for over 25 years, hyperlipidemia, hypertension, diabetic neuropathy, diabetic nephropathy, and diabetic retinopathy in addition to Vitamin D deficiency and morbid obesity. His list of medications included sitagliptin 50 mg, glimepiride MR 60–90 mg before the largest meal, metformin 750 mg bid, and dapagliflozin 10 mg daily. The consultation so far seemed a very much typical of what we see on a daily basis in this clinic. However, the use of dapagliflozin with his history of ESRD and history of renal transplantation was not particularly straightforward. We noted that he was treated by renal transplantation from a nonrelated live donor 7 years previously. We have discussed with him the lack of evidence of SGLT2 inhibitors in people who received renal transplants. "But I came to no harm," he said. Indeed, his records of renal function, hydration status, and glycemic control seemed satisfactory over the 2.5 years and remains so till now. These observations revealed that body weights weight, and systolic and diastolic blood pressure were reduced slightly after the introduction of dapagliflozin. Na, K, serum creatinine, eGFR, plasma albumin, hemoglobin, packed cell volume, and plasma albumin were not adversely affected. Glycated hemoglobin and fasting blood glucose were maintained reasonably FBG. His urine was consistently negative for ketone but loaded with heavy glycosuria. We promised him to look it up and even perhaps ask others who may have similar experience. However, we agreed to watch matters closely. **Physicians' Survey:** an online survey was conducted; the responses revealed that many of the physicians would use SGLT2 inhibitors in renal transplant recipients with reasonable renal function (eGFR > 60). Literature review detected a single case series of 10 patients treated with canagliflozin that gave similarly reassuring findings. **Conclusions:** Despite the lack of formal trial evidence, the index case revealed safe use of SGLT2 inhibitors by renal transplant recipients for a remarkably long period of 2.5 years. Physicians seem willing to use SGLT2 inhibitors in this group patients provided renal function is satisfactory on similar basis of nontransplant patients. There is a need to study this particular clinical scenario more formally.

P2032. Dulaglutide versus Glargine, Both Combined with Lispro, Mitigated Estimated Glomerular filtration Rate Decline in Patients with Type 2 Diabetes and Moderate-to-Severe Chronic Kidney Disease (AWARD-7)

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Background: In short-term studies, dulaglutide (DU) reduced albuminuria and did not change estimated glomerular filtration rate (eGFR) in type 2 diabetes (T2D) patients with normal kidney function. **Methods:** This phase 3 study compared weekly DU 1.5 mg or 0.75 mg to daily titrated insulin glargine (IG), both combined with insulin lispro, in patients with chronic kidney disease (CKD) stages 3–4 and T2D. **Results:** Baseline characteristics were similar between treatment groups (mean \pm standard deviation) eGFR (CKD-EPI): 38.3 ± 12.8 mL/min/1.73 m², HbA1c: $8.6\% \pm 1.0\%$, age: 64.6 ± 8.6 years, duration of T2D: 18.1 ± 8.7 years; 30% ($n = 174/576$) had eGFR <30 mL/min/1.73 m², 45% ($n = 258/575$) had urine albumin-to-creatinine ratio (UACR) >300 mg/g. At 26 weeks, eGFR remained stable with DU 1.5 mg and 0.75 mg (-0.1 and -0.4 mL/min/1.73 m², respectively) but with IG (-1.9 mL/min/1.73 m²) significantly decreased (two-sided $P < 0.05$). UACR was lowered in all treatment groups. Results were driven by patients with UACR >300 mg/g who had less decline in eGFR with both DU doses and greater reduction in UACR with DU 1.5 mg. **Conclusions:** DU-mitigated eGFR decline in T2D patients with moderate-to-severe CKD. The DU effect to lessen loss of kidney function and reduce albuminuria was most evident in patients with UACR > 300 mg/g.

P2033. Comparable Glycemic Control, Greater Weight Loss, and Lower Hypoglycemia

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Background: This phase III study compared once-weekly dulaglutide (DU) to titrated daily insulin glargine (IG), both combined with insulin lispro, in type 2 diabetes (T2D) patients with chronic kidney disease (CKD) stages 3–4. **Methods:** Participants were randomized (1:1:1) to DU 1.5 mg or DU 0.75 mg or titrated IG. **Results:** Baseline characteristics ($N = 576$): (mean \pm standard deviation) age 64.6 ± 8.6 years, HbA1c $8.6 \pm 1.0\%$, eGFR 38.3 ± 12.8 mL/min/1.73 m², BMI 32.5 ± 5.2 kg/m², and daily insulin dose 58.2 ± 31.8 U. DU 1.5 mg and 0.75 mg was noninferior to IG (LSM-1.2%, -1.1%, and -1.1%, respectively; 1-sided $P < 0.001$) for HbA1c change. Body weight decreased with DU but increased with IG. Hypoglycemia rate (≤ 70 mg/dL) was lower for DU 1.5 mg and 0.75 mg versus IG (5.5, 7.8, and 17.1 events/participant/year; $P < 0.001$). Nausea, vomiting, and diarrhea were more common with DU 1.5 mg (19.8%, 12.0%, and 15.6%) and DU 0.75 mg (11.1%, 5.8%, and 13.7%) versus IG (2.6%, 3.1%, and 3.1%). **Conclusions:** DU produced comparable glycemic control, greater weight loss, and lower hypoglycemia rate versus IG in T2D patients with CKD stages 3–4.

P2034. Similar Efficacy and Safety of LY2963016 Insulin Glargine and Insulin Glargine (Lantus®)

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Background: The ELEMENT-2 Phase 3, randomized, double-blind, 24-week study in patients with type 2 diabetes (T2D) showed that LY2963016 insulin glargine (LY-IGlar) has a similar efficacy and safety profile to insulin glargine (Lantus®; IGLar). By age, subgroup analyses were used to further characterize the similarity of LY-IGlar to IGLar, products with identical amino acid sequences. **Methods:** Subgroup analyses compared LY-IGlar and IGLar in patients from ELEMENT-2 based on age at study entry (≥ 65 years, <65 years). Data were evaluated at week 24 (LOCF analysis). **Results:** At baseline, patients ≥ 65 years ($N = 214$) had significantly ($P < 0.05$) longer diabetes duration, lower baseline HbA1c, body weight, and body mass index, and higher percentage reporting prestudy IGLar use than those < 65 years ($N = 542$). No significant treatment-by-age interactions ($P \geq 0.05$) were observed for any of the clinical efficacy and safety outcomes assessed, including the change in HbA1c from baseline (LSmean change, LY-IGLAR vs. IGLAR: ≥ 65 years: -1.31 vs. -1.28 ; <65 years: -1.28 vs. -1.36 ; interaction $P = 0.429$), incidence of hypoglycemia (≥ 65 years: 85.6% vs. 80.2%; <65 years: 76.7% vs. 76.7%; $P = 0.459$), total rate of hypoglycemia (events/patient per 30 days: ≥ 65 yrs: 2.1 vs. 2.2; <65 yrs: 1.6 vs. 1.7; $P = 0.737$), incidence of treatment-emergent adverse events ($P = 0.714$), serious adverse events ($P = 0.487$), and insulin antibodies (% binding, $P = 0.331$), indicating no significant differential treatment effect between LY-IGlar and IGLar across both age groups. Moreover, no treatment differences ($P > 0.05$) were observed within each age group for any of the clinical efficacy and safety outcomes. **Conclusions:** LY-IGlar and IGLar exhibit similar efficacy and safety in elderly and nonelderly patients with T2D.

P2035. Hypoglycemia in Adolescents with Type 1 Diabetes during Ramadan Fasting: A Freestyle Liber Flash Glucose Monitoring System Study

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Background: The data on basal insulin dose modification during Ramadan fasting in adolescents with type 1 diabetes (T1DM) is inconsistent. Here, we study the rates, timings, and severity of hypoglycemia using the flash glucose monitor in adolescents with T1DM while fasting the month of Ramadan. **Methods:** this is a 7-day study that recruited 25 adolescents with T1DM from Tawam Diabetes Center. Patients were monitored during fasting using the Freestyle Liber System to evaluate the rates, timings, and severity of hypoglycemia; defined as blood glucose below 70 mg/dL. Basal insulin treatment was modified where insulin glargine dose was reduced by 25% of pre-Ramadan dose and administered at 7 pm, while insulin detemir pre-Ramadan total dose was maintained but split into two doses, 2/3 of the dose was given at 7:00 pm and 1/3 was given between 4:00 am and 8:00 am. To determine the timings of hypoglycemia in relation to food intake in Ramadan, the day was divided into 4 intervals as follows: block A (07:00 pm–11:00 pm), block B (11:00 pm–03:00 am), block C (03:00 am–10:00 am), and block D (10:00 am–07:00 pm). The severity of hypoglycemia was assessed by analyzing glucose levels during 102 flashed readings of hypoglycemia. **Results:** all patients were interviewed by their physicians and diabetes educators before fasting. A total of 25 patients were recruited, mean age 16 ± 3 years and mean HbA1c 8.6 ± 1.2 ,

13 were on insulin glargine and 12 on detemir. The mean \pm standard deviation (SD) blood glucose was 200 ± 84 mg/dl, the overall time spent in hypoglycemia was $7.5\% \pm 3.25\%$. The mean \pm SD duration of hypoglycemia per individual was 9.3 ± 6.5 h in the 7-day observation period and the average daily time spent in hypoglycemia was 1.3 h per patient. The rate of hypoglycemia according to time intervals for all patients was 0%, 4%, 27%, and 69% in intervals A, B, C, and D, respectively. Analysis of 102 episodes of “flashed” hypoglycemia revealed that 65% were between 61 and 70 mg/dl, 27% between 50 and 60 mg/dl and 8% lower than 50 mg/dl. **Conclusions:** while the overall mean glucose level during Ramadan is high in our cohort of adolescents with T1DM, hypoglycemia is typically encountered during the hours preceding iftar time indicating over-effect of basal insulin. Physicians must consider reducing the dose of basal insulin to decrease the rate of hypoglycemia during fasting in adolescents with T1DM. Continuous glucose monitoring is a great asset for the monitoring of T1DM during Ramadan fasting.

P2036. Safety and Tolerability of Empagliflozin in Patients with Type 2 Diabetes and Advanced Kidney Disease: A Large Pooled Analysis of Placebo-Controlled Clinical Trials

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Background: Patients with type 2 diabetes (T2D) and overt chronic kidney disease (CKD) are considered at high risk of adverse events (AEs). Since the current European prescribing information for empagliflozin (EMPA) offers its use in patients with some degree of impaired renal function, we assessed its safety and tolerability in patients with T2D and advanced kidney disease. **Methods:** We pooled 12,620 patients randomized (1:1:1) to EMPA 10 mg, EMPA 25 mg, or placebo (PBO) in 15 PBO-controlled trials and four extension studies: this identified 1590, 586, and 32 individuals with CKD Stage 3A, 3B, and 4, respectively. Total exposure to PBO, EMPA 10 mg, and EMPA 25 mg was 1099, 1183, and 1169 years (CKD Stage 3A); 441, 415, and 422 years (CKD Stage 3B); and 15, 19, and 26 years (CKD Stage 4). Analyses are descriptive and based on investigator-reported AEs. **Results:** Rates of serious adverse effects, AEs leading to discontinuation, and AEs of special interest were generally balanced between the two EMPA doses and PBO across all three CKD subgroups. Consistent with the current EMA prescribing information, AE reporting for genital infections was higher for EMPA, and a numerical increase in UTI with EMPA in CKD Stage 4 was seen. The latter may be interpreted with caution due to the low number of events. **Conclusions:** Our comprehensive analysis suggests that safety and tolerability of EMPA in patients at advanced stages of CKD are reassuring. However, careful consideration of the current prescribing information for the use of EMPA in this population is recommended.

P2037. Normoglycemic Ketoacidosis in a Postoperative Gastric Bypass Patient Taking a Sodium-Glucose Cotransporter 2 Inhibitor

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Background: Type 2 diabetes mellitus (T2DM) is a chronic illness that afflicts millions of people worldwide. There are several medical and surgical therapies available. The sodium-glucose cotransporter 2 (SGLT2) inhibitors are a novel class of oral agents indicated in adults with T2DM that eliminate serum glucose via the urine. The current package inserts for SGLT2 inhibitors do not provide clear guidance on when to stop these agents before major surgery. We aim to report a case of normoglycemic ketoacidosis in a patient with T2DM taking canagliflozin (SGLT2 inhibitor) in the early postoperative period after gastric bypass and reviewing its underlying pathophysiology. **Methods:** Our patient is a 47-year-old female with a history of T2DM since 2001 and obesity (body mass index of 35 kg/m^2 and weight of 97 kg) who was prepared for laparoscopic gastric bypass surgery. Her diabetic medications included sitagliptin 100 mg daily, canagliflozin 100 mg daily, insulin degludec 60 units s.c. daily and insulin lispro 20 units s.c. three times a day before meals. She had a history of intolerance to metformin. Her insulin doses were reduced by 50% 2 weeks preoperatively as she was placed on low-carbohydrate liver reducing diet. Her other medications were continued and held at the time of surgery. Preoperative electrolytes were normal and HbA1c was 7.3%. GAD and islet cell antibodies were negative. She underwent uneventfully a laparoscopic Roux-en-Y gastric bypass (RYGB) with minimal blood loss. **Results:** On postoperative day 1, the patient was doing well and tolerating a clear liquid diet. Physical examination findings, urine output, and vital signs were normal. Laboratory examination showed serum glucose of 6.8 mmol/L, serum sodium of 133 mmol/L, serum chloride of 100 mmol/L, and carbon dioxide of 12 mmol/L, yielding a calculated anion gap of 21. Further investigation of the acidosis showed an elevated serum B-hydroxybutyrate of 4.1 mmol/L. Hemoglobin and lactic acid levels were normal. To avoid uncontrolled lipolysis and worsening ketoacidosis, i.v. fluids were changed to dextrose containing and she was started on glargine insulin 20 units s.c. daily in addition to a correctional lispro insulin sliding scale s.c. every 4 h. The patient continued to do well with rapid correction of the ketoacidosis and was discharged home on degludec insulin 20 units daily postoperative day 3. Several factors may have contributed to the development of normoglycemic ketoacidosis. The most striking suspect is the use of canagliflozin which causes osmotic diuresis, decreases glucose stores, and increases fatty acid oxidation. The preoperative diet may also have contributed to the fatty acid oxidation; however, most T2DM patients with similar preoperative diets have undergone RYGB surgery without this complication. Our patient was not on metformin, had normal biochemical parameters preoperatively, and did not have latent autoimmune diabetes of the adult effectively eliminating these factors as potential culprits. **Conclusions:** SGLT2 inhibitors have been shown to be beneficial in the management of T2DM patients and their use is on the rise. We encourage clinicians to report cases of normoglycemic ketoacidosis associated with SGLT2 inhibitor so that additional insight can improve their safe use. We also suggest that clinicians stop SGLT2 inhibitors at least 24 h before a major surgery to ensure near complete elimination of these drugs.

P2038. Comparative Study of Effect of Ranitidine and Sitagliptin on Healing of Acetic Acid-Induced Gastric Ulcers in Rats

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Background: Gastric ulcer healing is a complex process that is regulated by several promoting factors including Cox-2 and iNOS. Diabetes mellitus is usually associated with delayed gastric ulcer healing. Hence, the current study was designed to compare the effect of sitagliptin (dipeptidyl peptidase-4 inhibitor) and ranitidine (h2 blocker) on gastric ulcer healing in rat stomach. **Methods:** the study was conducted on 40 rats divided into four equal groups. Group 1 served as normal control group. Gastric ulcer was induced, by serosal application of acetic acid, in Group 2 (ulcer model group), Group 3 (sitagliptin-treated group), and Group 4 (Ranitidine-treated group). Sitagliptin and ranitidine were administered from day 3 to day 10 in Group 3 and Group 4. All rats were sacrificed on day 10 and stomachs were removed for pathological examination and immunohistochemical assessment of Cox-2 and iNOS expression. **Results:** pathological examination revealed that gastric ulcer healing was significantly impaired in the Sitagliptin-treated group (when compared to the ranitidine treated group) as evidenced by the significantly larger ulcerated area and ulcer base maturation impairment. Cox-2 and iNOS expression were significantly diminished in the sitagliptin-treated group as compared to the ranitidine-treated group. **Conclusions:** Sitagliptin significantly impairs gastric ulcer healing in rats possibly through inhibition of iNOS and Cox-2 expression. Our results raise the question of whether sitagliptin is advisable in diabetic patients with preexisting gastric ulcer. Our preliminary experimental findings need to be substantiated by future human studies.

P2039. Empagliflozin and Incidence of Acute Kidney Injury: Pooled Safety Analysis in More than 12,000 Individuals

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Background: SGLT2 inhibitors may alter renal hemodynamics, often reflected as a modest decrease in renal function shortly after drug initiation. Although GFR generally stabilizes during chronic treatment, reports of acute kidney injury (AKI) have emerged, representing an important safety consideration. **Methods:** To investigate AKI incidence with empagliflozin (EMPA), we analyzed pooled safety data from >12,000 patients with type 2 diabetes (T2D) who were randomized (1:1:1) to EMPA 10 mg, EMPA 25 mg, or placebo (PBO) in 15 Phase I–III trials (including EMPA-REG OUTCOME®) plus four extension studies. Acute renal failure (ARF) incidence was assessed using investigator-reported adverse events (without adjudication) coded according to the narrow standardized MedDRA query. AKI was captured by the MedDRA preferred term “AKI.” **Results:** Total exposure (patient-years) was 7782, 7754, and 7369 for EMPA 10 mg, EMPA 25 mg, and PBO, respectively. The incidence rates of either ARF or AKI were similar for the two EMPA doses and PBO. As expected, ARF and AKI events increased with decreasing renal function, yet the overall risk with EMPA was similar to PBO across all subgroups of baseline eGFR. **Conclusions:** This large pooled analysis of >12,000

patients with T2D does not suggest an increased risk for acute renal events with EMPA in the setting of controlled clinical trials. When initiating EMPA, careful monitoring of renal function according to local prescribing information is recommended

P3001. Study of Possible Relation between Thyroid Volume, Nodule Formation, and Glucose Metabolism Disorders

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Background: Insulin resistance (IR) with compensatory hyperinsulinemia is a key factor involved in the pathogenesis of glucose metabolism (GM) disorders (including impaired fasting glucose and glucose tolerance and frank diabetes mellitus) as well as increased thyroid gland volume and nodule prevalence in patients with metabolic syndrome. On the other hand, thyroid hormone contributes to the regulation of carbohydrates metabolism and pancreatic function. **Aim:** Our cross-sectional study aimed to investigate the possible association between the different GM disorders and the thyroid gland volume. **Methods:** The study was conducted on 400 subjects through 1 year duration, being divided into 50% as diabetic patients in comparison to 25% as prediabetics and 25% as a control, all were investigated by fasting blood sugar (FBS) and postprandial blood sugar (PPBS) as well as fasting insulin level (for HOMA-IR calculation) in addition to TSH assay combined with thyroid ultrasound. **Results:** The study showed that thyroid volume is significantly larger in patients with diabetes compared to the control group as well as significant positive correlation between thyroid volume and FBS, fasting insulin, HOMA-IR, 2 h PPBS, and HbA1c in addition to significant association between serum TSH levels and thyroid volume. **Conclusions:** The main regulator of thyroid cell growth and differentiation is TSH. Elevated insulin levels due to IR lead to an increase in IGF-1 levels (which is an important hypertrophic and progression factor for a series of cell types including thyroid cells with increased risk of malignancy in such patients).

P2040. Meta-Analysis Comparing Hypoglycemia Rates of Insulin Degludec with Insulin Glargine U100 across Clinical Trials with up to 2 Years' Duration

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Background: Insulin degludec (IDeg) is a basal insulin with a long and stable glucose-lowering effect with low day-to-day variability. A prespecified meta-analysis of hypoglycemia across the IDeg core phase 3a trials has previously been conducted and published. The aim of this *post hoc* meta-analysis was to compare the rate of hypoglycemia with IDeg versus insulin glargine U100 (IGlar) across the phase 3a trials including all available trial extensions ($n = 4$) plus one new trial and to confirm the results from the previous prespecified meta-analysis. **Methods:** The *post hoc* meta-analysis included two trials in patients with type 1 diabetes (T1D) and six trials in patients with type 2 diabetes (T2D); IDeg: $n = 3454$; IGlar U100: $n = 1709$.

Hypoglycemia was defined as rates of self-reported confirmed hypoglycemia (blood glucose <3.1 mmol/L [56 mg/dL] or severe hypoglycemia requiring assistance) and nocturnal (00:01–05:59 am both inclusive) confirmed hypoglycemia. Rates were analyzed with a negative binomial regression model on patient level data. **Results:** IDeg resulted in statistically significantly lower rates of confirmed and nocturnal confirmed hypoglycemia versus IGLar U100 in T2D and for nocturnal confirmed hypoglycemia in T1D. Analyses of the maintenance period (from 16 weeks onward) demonstrated more pronounced benefits with IDeg versus IGLar U100 in both T1D and T2D. **Conclusions:** This *post hoc* meta-analysis confirms and extends the outcomes of the previously published prespecified meta-analysis. Even with the inclusion of additional trial data for up to 2 years' duration, the lower rates of both overall (T2D) and nocturnal confirmed (T1D and T2D, respectively) hypoglycemia with IDeg versus IGLar U100 are maintained.

P3002. Novel Predictors of Gestational Diabetes Mellitus among Pregnant Saudi Women

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Background: The aim of this study was to assess the prevalence of gestational diabetes mellitus (GDM) in Saudi pregnant women and to identify the risk factors involved in the development of GDM. **Methods:** This was a prospective study of 297 pregnant Saudi women (mean age 28.9 ± 5.3 years) performed between January 2014 and December 2015 from three tertiary care antenatal clinics in Riyadh, Saudi Arabia. Demographic, anthropometric, biochemical, and lifestyle factors were collected during the first trimester of pregnancy to assess GDM risk. Diagnosis of GDM was made by glucose tolerance test in the second trimester of pregnancy. **Results:** Of 297 pregnant women, 98 (33%) developed GDM. Family history of type 2 diabetes mellitus, prepregnancy, and being obese in the first and second trimesters were significant risk factors for GDM ($P < 0.05$). Previous history of GDM (odds ratio [OR] 11.13 95%, confidence interval [CI] 3.1–40.0, $P < 0.001$), Vitamin D deficiency (OR 4.0, 95%, CI 1.1–14.2, $P < 0.03$), high HbA1c (OR 3.1, 95% CI 1.3–7.1, $P = 0.037$), and low high-density lipoprotein (HDL)-cholesterol (OR 2.1, 95% CI 1.0–4.4, $P < 0.046$) during early pregnancy were significant risk factors for GDM. In addition, women with GDM had higher random blood glucose levels in early pregnancy than women who did not develop GDM ($P = 0.002$). Maternal lifestyle factors such as physical activity conferred protection against GDM ($P = 0.007$). **Conclusions:** The prevalence of GDM is high among Saudi pregnant women. Vitamin D deficiency, low HDL-cholesterol, and high HbA1c emerged as novel predictors of GDM in Saudi population.

P3003. A Challenging Diagnosis of Hypoglycemia in a Young Female

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Background: Hypoglycemia diagnosis and management constitute a dilemma for endocrinologist due to wide list of differential diagnoses. **Methods:** We present the clinical and biochemical findings of a young Saudi female who presented with recurrent hypoglycemia.

Results: We report the case of a 22-year-old Saudi female who was referred to our clinic with recurrent episodes of hypoglycemia over a 3-month period. History and examination were unremarkable. After ruling out chronic illness and hypoadrenalism, she underwent a 72-h fasting test, developed an episode with low glucose of 1.6 mmol, low insulin 12.4 pmol/L (17.8–173) using Roche Elecsys, C-peptide 0.31 nmol/L (0.37–1.47), proinsulin 9.3 pmol/L (3–20), beta-hydroxybutyric acid 0.1 mmol/L (<0.4), and negative sulfonyleurea screen indicating hypoinsulinemic hypoglycemia. Insulin antibodies result was equivocal. The differential diagnosis included either IGF-11-mediated hypoglycemia or factitious hypoglycemia. IGF-1 was low at 3.6 ng/ml (10–150) and IGF-11 was normal at 532 ng/ml (133–960), however, IGF-11/IGF-1 ratio was very high at 147 ($n < 10$), favoring IGF-11 secreting tumor. Nonetheless, all imaging including endoscopic ultrasound and computed tomography chest-abdomen-pelvis were negative and factitious hypoglycemia was suspected, especially both parents being diabetic on insulin. A random sample during a hypoglycemic episode with laboratory revealed that blood glucose was 3.8 mmol/L showed low insulin (8.5 pmol/L) and C-peptide (0.17 ng/ml) using Roche assay, however, running the same sample with Abbott Architect assay at a different hospital confirmed very high insulin levels at 183 pmol/L (35–72 pmol/L), indicating a high possibility of exogenous insulin analogue use which can be detected by Abbott rather than Roche assay. **Conclusions:** We present a challenging case of factitious hypoglycemia highlighting the limitations of some insulin assays in detecting insulin analogs.

P3004. Recurrent Insulinoma in a 10-Year-Old Boy with Down syndrome

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Background: An insulinoma is a rare tumor with an incidence of four cases per million per year in adults. The incidence in children is not established. There is limited literature available in children with insulinoma and only one case reported in association with Down syndrome in adults. Insulinoma diagnosis is frequently missed in adults as well as in children. Hypoglycemia with elevated insulin, C-peptide, and absent ketones is highly suggestive of hyperinsulinism. **Methods:** We present a case of a 10-year-old boy with Down syndrome with recurrent insulinoma. He was initially misdiagnosed as adrenal insufficiency and developed Cushingoid features and obesity secondary to hydrocortisone treatment and excessive sugar intake. The tumor was successfully localized in the head of the pancreas with magnetic resonance imaging (MRI) and octreotide scan on the first presentation. Medical treatment with diazoxide and octreotide could not achieve normal blood glucose levels. The insulinoma was laparoscopically enucleated and pathological examination confirmed a neuroendocrine tumor. Subsequently, he had complete resolution of symptoms. He had a recurrence after 2 years with frequent episodes of hypoglycemia. The biochemical workup was suggestive of hyperinsulinism. MRI and positron emission tomography (PET) scan confirmed the recurrence at the same site (head of the pancreas). He had an open laparotomy for insulinoma resection. The pathology was consistent with benign insulinoma, and subsequently, he had complete resolution of symptoms. **Results:** The insulinoma is a challenging diagnosis in children. Medical treatment is usually not effective. Surgical treatment may provide complete resolution of hypoglycemia-related symptoms. **Conclusions:** Insulinoma is a very rare tumor in children; it should be considered in the differential diagnosis of hypoglycemia with absent ketones. Refractory neurological symptoms

such as seizure, migraine, mood changes, and regression of learning abilities should suggest evaluation for hypoglycemia. MRI with contrast and PET scan would localize the majority of pancreatic beta islet cell lesions. Medical treatment with diazoxide, octreotide, and the addition of cornstarch in feeds is not curative but can be supportive to maintain normoglycemia until the surgical resection. Surgical resection is the only curative treatment. The surgical procedure of choice (laparoscopic/open laparotomy) depends on local expertise, preoperative localization, tumor size, and number. Surgical treatment results in complete resolution of symptoms, but all cases should be closely followed up to monitor for recurrence. The children with Down syndrome and other similar conditions may not be able to express themselves properly causing underestimation and missing of severe diagnoses. These individuals deserve full attention and every possible modality to provide them best health care.

P4001. Power Doppler Assessment of Uterine and Ovarian Blood Flows in Polycystic Ovary Syndrome Patients and Normal Patients and Correlation with Pregnancy Outcome in Controlled Ovarian Stimulation Cycles.

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Background: Polycystic ovary syndrome (PCOS) characterized by chronic anovulation and hyperandrogenism affects approximately 5%–10% of women of reproductive age. This multifactorial disorder has clinical, biochemical, and ultrasonographic features. One end of PCOS spectrum comprises women who manifest ultrasound evidence of polycystic ovaries without any clinical manifestations of the syndrome. Despite extensive research performed in the last few years, the debate still continues as to the etiology and definition of PCOS due to varied range of presentation of this disease. For many years, the diagnosis was purely clinical and was based on the presence of obesity, hirsutism, amenorrhea, and enlarged ovaries. The transvaginal ultrasound defined characteristics of PCOS as higher number of subcapsular small follicles in ovaries, higher ovarian volume, and increased echogenicity of ovarian stroma. This progress in accurately diagnosing PCOS has led to differentiate several subgroups of PCOS caused by hypothalamic pituitary ovarian or adrenal steroidogenic defects. **Methods:** Based on clinical history, menstrual history, physical examination, and ultrasound findings, the women were divided into two groups. Group 1 consisted of 50 women (normal ovaries group or USNO group) who had regular spontaneous ovulatory menstrual cycles ranging from 25 to 32 days and a baseline transvaginal ultrasound scan showing normal ovaries. Group 2 consisted of 50 women (the ultrasound PCO group or USPCO group) who had regular cycles ranging from 25 to 32 days, no clinical manifestations of PCOS, and a baseline transvaginal ultrasound scan showing polycystic ovaries. The ovaries were diagnosed as polycystic if 10 or more subcapsular follicles of 2–8 mm in diameter in one plane were detected in either ovary; ovarian volume, stromal volume, and stromal echogenicity were not used as criteria because no available definitions provide objective criteria or precise cut-off values to determine them. All patients underwent transvaginal ultrasound associated with Doppler flow measurement of the uterine artery on day 2 of menstrual cycle and on day of trigger (HCG administration) in controlled ovarian stimulation cycles. These groups were studied prospectively for correlation with uterine blood flows, ovarian blood flows with pregnancy outcomes. **Results:** In this study, we found that Doppler on day 2 of cycle, uterine artery pulsatility index was significantly higher ($P < 0.001$) in women with

polycystic ovaries as compared with controls. There was no difference in any Doppler measure of blood flows between two groups on day of trigger. There was no significant difference in the pregnancy outcome in two groups in controlled ovarian stimulated cycles. **Conclusions:** Doppler uterine blood flows in early follicular phase can be a measure to diagnose polycystic women on ultrasound. Doppler blood flow study uterine and ovarian in controlled ovarian stimulated cycles for patients undergoing intrauterine insemination has no impact on the pregnancy outcomes when compared in polycystic ovaries patients and normal patients.

P5001. Persistent Müllerian Duct Syndrome in a Middle-Aged Man

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Background: Persistent Müllerian duct syndrome (PMDS) is a rare congenital abnormality with unknown prevalence. Approximately 150 cases reported around the world. PMDS leads to pseudohermaphroditism due to the persistence of Müllerian duct derivatives (i.e., a uterus, cervix, fallopian tubes, and the upper two-thirds of a vagina) in otherwise normally virilized male patients with a normal karyotype. It is usually diagnosed in early years of life at the time of surgery for cryptorchidism or repair of an inguinal hernia. **Methods:** We report a rare case of PMDS in a middle-aged infertile male who was referred to our center for further evaluation of primary infertility. **Results:** The patient is a 47-year-old male referred to endocrinology clinic due to high follicle stimulating hormone and luteinizing hormone levels and low testosterone. The patient has primary infertility with satisfactory libido and potency and history of bilateral herniorrhaphy. The clinical examination revealed normal sexual characteristics and bilateral empty scrotum. Preoperative azoospermia confirmed male karyotype of 46 XY. Magnetic resonance imaging-pelvis revealed rudimentary uterus and intra-abdominal bilateral undescended testes. Exploratory laparotomy revealed undescended testes, uterus, and vagina in the pelvis. Histopathology showed unremarkable myometrium consistent with uterine tissue. He was followed and started on testosterone injections. **Conclusions:** PMDS results from failure in the synthesis or release of the anti-Müllerian hormone or the failure of the end organ to respond to it. PMDS is usually inherited, likely via a sex-linked autosomal recessive or X-linked recessive inheritance pattern. A high index of suspicion should be kept in mind in the event of bilateral cryptorchidism associated with hernia. Early treatment is necessary to reduce the complications.

P6001. Addison's Disease Presenting as a Refractory Vomiting

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Background: Over the two decades, there has been significant improvement in the medical field in elucidating the underlying pathophysiology and genetics of Addison's disease. Adrenal insufficiency (Addison's disease) is a rare disease with an incidence of 0.8/1,000,000 cases. The diagnosis may be delayed if clinical presentation mimics gastrointestinal disorders. **Methods:** We report a 30-year-old woman presented with recurrent episodes of nausea, vomiting, and abdominal pain. Investigations including routine blood

test, gastroscopy, with duodenal biopsy and abdominal computed tomographic scan, failed to find a cause of these symptoms. Repeated clinical examination of the patient and presence of hyperpigmentation of the palmar creases and oral mucosa and postural hypotension confirmed by low serum cortisol at early morning with elevated adrenocorticotropic hormone a diagnosis of Addison's disease was considered. **Results:** This case is important as it highlights an unusual presentation of Addison's disease, a rare and easily treated condition. Replacement with hydrocortisone resulted in the prompt resolution of intractable gastrointestinal symptoms and hypotension. A clinician should remember to check adrenal gland in patients with refractory vomiting, especially when routine investigations and invasive procedures (such as gastroscopy) do not find a cause. **Conclusions:** The present case report underscores the importance of considering Addison's disease among the causes of abdominal pain and unexplained repeated vomiting. The case also signifies the importance of reviewing medical history and performing repeated clinical examination in patients whenever the diagnosis is not achieved or is doubted.

P6002. Expect the Unexpected: A Case of Severe Adult-Onset Glucocorticoid Deficiency and Testicular Adrenal Rest Tumors in a Patient with Congenital Adrenal Hyperplasia

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Background: Congenital adrenal hyperplasia (CAH) encompasses a group of autosomal-recessive enzymatic defects in adrenal steroidogenesis. 21-Hydroxylase deficiency is the most common defect and accounts for >90% of CAH cases. The clinical presentation varies depending on the severity of the enzymatic defect. While classic CAH can present with adrenal crisis and can lead to testicular adrenal rest tumors (TARTs) if uncontrolled, men affected with its nonclassical form (NCCAH) usually have a normal glucocorticoid function as well as normal testicular function and fertility. TART and infertility have been reported in some NCCAH cases. **Methods:** Here, we report a case of CAH which presented with a late onset severe adrenal insufficiency. A 30-year-old male who was diagnosed with CAH in the peripubertal period when he presented with generalized hyperpigmentation. He has been off glucocorticoids for >10 years. In his late 20s, he presented with adrenal insufficiency symptoms including fatigue, abdominal pain, and orthostatic dizziness. Laboratory data were significant for very low cortisol level, high adrenocorticotropic hormone (ACTH), and 17 hydroxyprogesterone levels in the setting of normal testosterone level. Laboratory data included a basal cortisol of 8 nmol/l (81–550 nmol/l) and 0.2 nmol/l after ACTH stimulation. ACTH was 3059.5 (7–50 pg/ml), renin 767 mIU/ml (2.8–39.9 mIU/ml), 17 (OH)progesterone 50.2 nmol/l (1.8–10.3 nmol/l), testosterone 29.0 nmol/l (4.9–32 nmol/l), aldosterone <0.097 ng/dl (2.2–35 ng/dl), DHEA-S 1.63 umol/l (4.6–16 umol/l). Testicular ultrasound was reported as bizarre heterogeneous bilateral diffuse cortical and parenchymal calcifications. **Results:** CAH that is complicated by severe TART and adrenal insufficiency was diagnosed based on history and clinical presentation supported by significantly elevated 17 (OH)progesterone and ACTH levels as well as very low cortisol and aldosterone. **Conclusions:** This case illustrates the heterogeneity of CAH clinical presentation. The patient had features of both the classical and the nonclassical forms of the illness. He has a significant adult-onset cortisol deficiency which is not usually seen after puberty.

P6003. Case of Bilateral Adrenal Hemorrhage

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Background: Bilateral adrenal hemorrhage is a rare cause of adrenal insufficiency. The common causes include sepsis, antiphospholipid syndrome, trauma, lymphoma, sarcoidosis, thromboembolic disease, and anticoagulant usage. Usually, the diagnosis is not suspected till a computed tomographic (CT) scan of the abdomen is performed mostly for another medical/surgical indication. If picked up early, increased morbidity and mortality can be avoided by timely administration of steroids. **Methods:** This was a case report of a female seen in a General Endocrine Clinic. A 62-year-old woman was seen in the Endocrine Clinic after an incidental finding of bilateral adrenal hemorrhage on her CT scan of her abdomen. She was initially admitted with acute kidney injury, raised inflammatory markers, and pyrexia. Initial USS of her abdomen performed for renal angle tenderness showed a renal abscess in the left lower pole of the kidney and multiple liver cysts. Subsequent CT scan done a few days later showed that the adrenal glands were smaller in size indicating bilateral adrenal hemorrhage. During the admission, deep vein thrombosis was also diagnosed in the right leg when she was in intensive care and she completed a course of anticoagulation. During her prolonged admission in the hospital, she was noted to be frequently hypotensive requiring inotropic support at times. **Results:** Synacthen test performed showed a flat response confirming adrenal insufficiency as a consequence of the adrenal hemorrhage with a peak cortisol response of 308. She was duly commenced on steroid replacement. The cause of the bilateral adrenal was severe urosepsis that she presented with. Further investigations for the underlying cause of her adrenal hemorrhage were normal including a serum ACE level and LDH levels. She had no further episodes of thromboembolism. **Conclusions:** This case demonstrates that adrenal hemorrhage should be suspected in patients with severe sepsis who have unexplained and persistent hypotension. Early recognition and intervention in such cases can be vital.

P6004. Delayed Remission of Cushing's Disease Following Transsphenoidal Surgery

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Background: The remission rate of Cushing's disease (CD) after transsphenoidal surgery (TS) is variable ranging between 60% and 90% due to many factors including the definition of remission and follow-up period. Currently, no consensus on the definition of remission of CD post-TS and most endocrinologists consider lack of hypoadrenalism in the immediate postoperative period, an indication for further treatment. **Methods:** We present the case of a young Saudi male with CD who experienced delayed spontaneous remission of hypercortisolemia after TS. **Results:** A 32-year-old Saudi male was referred to our hospital with a presentation of multiple vertebral fractures, along with a history of poorly controlled type 2 diabetes requiring insulin and severe hypertension for 7 years. Physical examination confirmed cushingoid features. The biochemical diagnosis of Cushing was confirmed after failing 1 mg (dexamethasone suppression test [DST]) with serum cortisol at 1720 nmol/L; adrenocorticotropic hormone (ACTH) was high at 33.9 pmol/L (1.6–13.9). Magnetic resonance imaging (MRI)-pituitary showed 8 mm × 9 mm pituitary microadenoma and the patient underwent TS. Despite immediate improvement in diabetes mellitus and blood pressure control, early postoperative assessment suggested

treatment failure with day 1 morning cortisol 397 nmol/L, and failure of DST on day 4 (serum cortisol: 484 nmol/L). The tumor stained positive for ACTH. Four months later, clinical improvement continued and follow-up pituitary MRI showed no evidence of residual tumor. Biochemically, 24-h urinary free cortisol normalized at 255 µg/24 h (21–292) and ACTH dropped to 11.8 pmol/L. **Conclusions:** This case highlights the possibility of late remission of hypercortisolemia after TS, which is well documented in up to 5.6% of the cases. Clinicians need to be aware of this possibility before considering additional treatment.

P6005. The Epidemiology of Normal Pituitary Magnetic Resonance Imaging Associated With Pituitary Hormones Abnormalities: A Retrospective Single-Center Study in Saudi Community-Based Hospital

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Background: Data on pituitary magnetic resonance imaging (MRI) in patients with abnormal pituitary hormones in Saudi Arabia are very scarce. **Methods:** The study design was a retrospective analysis of radiological and hormonal data of patients with pituitary MRI between January 2008 and December 2015. **Results:** Over a 7-year period, of 537 patients, 238 (44.3%) subjects, 80 (33.6%) males and 158 (66.4%) females, were diagnosed to have normal pituitary MRI. Patients with normal pituitary MRI were significantly younger than the abnormal pituitary MRI (34.3 ± 13.6 vs. 37.9 ± 15.5 , $P = 0.005$). Of total subjects, abnormal pituitary MRI was nonsignificantly more prevalent in females, $P = 0.1$. Normal pituitary images were associated with only pituitary hormones deficiency; panhypopituitarism, secondary hypogonadism, growth hormone deficiency, and central hypothyroidism. **Conclusions:** Our data showed that pituitary hormones deficiency is more often seen in normal pituitary MRI.

P6006. Reversal of Clinical and Metabolic Consequences of Cushing's Disease

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Background: Patients with Cushing's syndrome are at increased risk of cardiovascular mortality attributed to metabolic derangements. Remission leads to partial improvement in most; complete normalization of risk factors is rare. Residual cardiovascular mortality remains higher than general population albeit is lowered after surgery. Persistence of elevated risk of mortality is multifactorial due to irreversible glucocorticoid-induced mechanism "metabolic memory" on vasculature, leading to endothelial dysfunction, atherosclerosis, cardiomyopathy, and obesity. **Methods:** We report a 36-year-old male in whom consequences of Cushing's disease relented after pituitary surgery. He presented with a 9-month history of weight gain, facial puffiness, and purplish abdominal striae. Type 2 diabetes and hypertension were diagnosed 6 months ago treated with metformin and four antihypertensive agents. He weighed 101 kg, with body mass index (BMI) 34, blood pressure of 148/110, plethoric face, supraclavicular fat pads, central obesity and nonpitting edema of legs. He had high 24-h urine-free cortisol of 2686 nmol/L (100–379). 1 mg overnight dexamethasone suppression test demonstrated morning cortisol of 673 nmol/L (171–536). Elevated adrenocorticotrophic hormone (ACTH)

level of 138 ng/L (5–60) was suggestive of ACTH-dependent Cushing's syndrome. Two-day, 2 mg DST resulted in still higher albeit over 50% suppression of morning cortisol supporting pituitary source of ACTH. **Results:** Magnetic resonance imaging of the pituitary gland was normal. Inferior petrosal sinus sampling demonstrated a right-sided gradient. Transsphenoidal pituitary adenectomy revealed corticotroph adenoma with positive ACTH staining. He is in remission with morning cortisol below 50 nmol/L and normal ACTH. A distinctive feature of our case is normalization of all metabolic derangements. HbA1c lowered from 6.9% to 5.9% and normotension achieved without medications 1 year postsurgery. He lost 14 kg weight and BMI improved to 29. Dyslipidemia improved significantly from baseline. **Conclusions:** He requires monitoring and aggressive control of cardiovascular risk factors long-term despite remission of metabolic abnormalities.

P6007. Imatinib Associated with Syndrome of Inappropriate Secretion of Antidiuretic Hormone

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Background: Hyponatremia in oncology patients is common electrolyte abnormality that can be related to paraneoplastic syndrome in case of small cell lung cancer, dehydration, or chemotherapy-related side effects. Drug-induced syndrome of inappropriate secretion of antidiuretic hormone (SIADH) has been reported with use of chemotherapy such as vinblastine, vincristine, and cyclophosphamide. We report a case of chronic myeloid leukemia that developed hyponatremia (SIADH) as rare side effect of imatinib use. **Methods:** A 68-year-old male was known to have chronic myeloid leukemia for 17 years. He was maintained on imatinib initially on 600 mg dose and then reduced gradually to 200 mg as patient developed anemia, neutropenia as side effects. He had a medical history of diabetes, hypertension, ischemic heart disease, and dyslipidemia. He was noticed to have chronic mild hyponatremia in the range of 134–132. He was given desloratadine for allergic rhinitis and was seen the next day in a clinic where he had significant asymptomatic hypo-osmolar hyponatremia of 124. The urine osmolality was elevated 312, and his thyroid function test, other electrolytes, and renal function were normal. Even though imatinib can rarely cause hyponatremia, nephrology team decided to hold the medication and observe the trend of hyponatremia. Within 5 days, the patient noticed that he had increased urine output and his repeated sodium level showed resolution of hyponatremia. **Results:** in review of literature, tyrosine kinase inhibitors such as imatinib are rarely associated with drug-induced syndrome of inappropriate SIADH. Two cases reported the development of hyponatremia (SIADH) with the use of high dose of imatinib. Dose reduction and fluid restriction resulted in resolution of hyponatremia. **Conclusions:** Imatinib associated hyponatremia is a rare side effect that needs to be addressed for oncology patients with drug-induced SIADH.

P7001. Behavioral therapy in Adolescents with Type 1 Diabetes: Does It Improve Control and Distress?

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Background: Hospitalization for chronic diseases such as diabetes is a cost burden on the American healthcare system. With the new HCAHPS reimbursement structure, readmissions are even more

costly to hospitals. Adolescents with type 1 diabetes (T1D) often have difficulty transitioning to diabetes self-management resulting in multiple admissions for diabetic ketoacidosis or elevated glycosylated hemoglobin (HbA1C). There are studies addressing the use of behavioral therapy as an adjunct in traditional diabetes management. To date, no systematic review exists summarizing the studies exploring behavioral therapy in adolescents with T1D. **Methods:** A literature review was conducted using keywords diabetes, adolescent*, control and therap*. Articles were evaluated utilizing the Hopkins EBP tool and seven articles were selected for inclusion. Data were compared and clinical recommendations for further investigation made. **Results:** Of the seven studies evaluated, four were considered high quality and three moderate quality. The review included RCTs, CT, qualitative, cross-sectional, and a retrospective matched cohort study. All studies identified statistically significant ($P < 0.05$) results for the behavioral therapy interventions in reducing HbA1C and diabetes distress. **Conclusions:** Behavioral therapy interventions in T1D adolescents with suboptimal control have been shown to consistently produce improved HbA1C values. Further investigation is needed to evaluate which behavioral therapy methods may be most effective in improving control in this patient population.

P8001. Liddle's Syndrome with Nephrocalcinosis

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Background: Liddle's syndrome is itself very rare genetic condition, and nephrocalcinosis in this condition is further rarely described. I present this rare case in a 14-year-old boy who has been suffering for years and was not given any diagnosis and solution. **Methods:** I started with his full family history and found out that his sister also suffers from hypokalemia who lives in different city and was not willing to come for investigation. His physical examination was normal apart from high blood pressure. His biochemical profile showed low potassium, metabolic acidosis, and low renin and aldosterone. His imaging showed nephrocalcinosis. **Results:** A 14-year-old had severe hypertension, hypokalemia, and nephrocalcinosis for years. Further, his sister had similar complaints but was living in a different city and was not approachable. His blood pressure (BP) was not under control despite several antihypertensives and potassium replacement. His clinical examination was completely normal. His biochemical profile was normal apart from low potassium and metabolic alkalosis. His renin and aldosterone levels were low normal. His spironolactone was changed to amiloride which helped to improve his BP and we were able to give him a diagnosis of Liddle's syndrome. The genetic testing for this condition is not available in our hospital. **Conclusions:** Liddle's syndrome is treated with a combination of low sodium diet and potassium-sparing diuretic drugs (e.g., amiloride). It is extremely rare, but it has been found in few cases, and our patient also had significant nephrocalcinosis, with fewer than 30 pedigrees or isolated cases having been reported worldwide. The nephrocalcinosis in this condition is not well described.

P8002. Identification of a Novel MEN1 Gene Mutation in Saudi Arabian Patient with Multiple Endocrine Tumors

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Background: MEN1 syndrome clinical symptomatology is extremely heterogeneous. This important heterogeneity can be explained, to

some extent, by the 1300 mutations identified to date in the MEN1 gene. Genotype–phenotype correlation is quite complex. A family can share the same MEN1 gene mutation and have important discrepancies at the phenotypic level. This huge genotype–phenotype variability can also affect identical twins. MEN1 gene is located on 11q13 and defined as a tumor suppressor gene. Our patient was diagnosed for a large insulinoma 5 cm, asymptomatic hyperparathyroidism and found to have diffuse skin tags and acanthosis nigricans. Molecular MEN1 gene subsequently revealed, so far in our knowledge, new heterozygous variant c.1049 + 2T>A. **Methods:** We present the clinical and laboratory examination and imaging findings, along with a review of the literature. **Results:** A 28-year-old Saudi male presenting with a 2-year history of recurrent symptomatic hypoglycemia. Further workup confirmed the clinical diagnosis of MEN1 and genetic testing proved this to be a novel mutation in the gene. **Conclusions:** This case describes a novel mutation in the MEN1 gene raises the discussion if there will ever be a genotype–phenotype association as in other MEN syndromes.

P8003. Endocrine Dysfunction Associated with Immunotherapy

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Background: Immune checkpoint inhibitors which include cytotoxic T-lymphocyte-associated protein 4, such as ipilimumab and programmed cell death protein 1 such as nivolumab and pembrolizumab, are being used for the treatment of malignant melanomas and solid tumors. Despite clinical benefits, these agents have been known to cause certain immune-related adverse effects which may be dermatological, gastrointestinal, endocrine, or other immune phenomena. The endocrine side effects of checkpoint inhibition include hypophysitis and thyroid and adrenal dysfunction. There are however no established monitoring guidelines. The objective was to monitor any endocrine dysfunction in patients undergoing treatment with immune checkpoint inhibitors and devise guidelines for monitoring these patients long term. **Methods:** This study was a retrospective review of all patients who received immune checkpoint inhibitors (as single agents and in combination) in the Royal Cornwall Hospital, Truro, UK, between 2013 and 2017. Data were collected from patient notes and the electronic medical records and compared with standards devised by oncology and endocrinology consultants. These standards were (1) baseline cortisol and thyroid stimulating hormone (TSH) to be checked for all patients before treatment; (2) TSH and cortisol to be checked every cycle or monthly from the point of initiation of treatment up to 3 months after completion for all patients. **Results:** Seventy patients were identified, of which 10% developed endocrine dysfunction, however, inadequate monitoring of these patients endocrine function. **Conclusions:** There is a significant risk of endocrine dysfunction with the use of immune checkpoint mediators; therefore, it is suggested that cortisol and TSH should be monitored from baseline and regularly, which could potentially be life-saving.

P8004. Unusual Pattern of Thyroid Function Tests with Dual Oxidase 2 Mutation and Iodine Deficiency

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Background: Dual oxidase 2 (DUOX2), a reduced NAD phosphate:O₂ oxidoreductase flavoprotein, is a component of the thyrocyte which

produces H_2O_2 required for thyroid hormone synthesis. DUOX2 mutation has been proposed as a cause of congenital hypothyroidism. **Methods: Case:** A 30-year-old woman with long-standing goiter had polyhydramnios in the fourth pregnancy and had a baby with neonatal goiter and hypothyroidism. Her thyroid function tests (TFTs) showed an unusual pattern of TSH being marginally elevated, 6.4 mIU/L (0.3–4.5) with free T3 in upper normal range, 6.8 pmol/L (range 3.9–6.8) and low free T4 4.8 pmol/L (10.5–26). Similar pattern was seen in another laboratory excluding assay interference. Random cortisol was 579 and serum prolactin was appropriately raised at 1268. She was feeling tired for several years before pregnancy and had gained weight. Her menstrual cycle was regular. Family history includes two maternal aunts with hypothyroidism. She was vegetarian and was vegan for 13 years. **Results:** Subsequent TFTs in mother and baby showed an elevated free T3/T4 ratio, which suggests inadequate iodination either due to lack substrate (iodine) or dyshormonogenesis. Gene sequencing showed dominantly inherited heterozygous DUOX2 missense mutation in both mother and baby. Spot urine iodine and 24-h urinary iodine measurement in mother showed profoundly low iodine level (0.05 μ mol) suggesting severe iodine deficiency which could explain long-standing goiter. She was commenced on iodine supplement. The baby was on levothyroxine replacement which normalized his TFTs. **Conclusions:** DUOX2 mutation is rare and being heterozygous, it is unlikely to be pathogenic. However, combined with environmental factor such as iodine deficiency could explain the etiology in our case.

P9001. Metformin and the Prevention of Cancer: Where is the Position in 2017?

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Background: Obesity and its metabolic complications, including diabetes, have been associated with an increased risk of several cancers. Thus, the potential use of metformin as a novel cancer prevention strategy has generated much excitement in view of its low cost, favorable safety profile, and its potential for biological specificity in disrupting the association between obesity and cancer. **Methods:** Metformin seems to affect multiple key processes related to cell growth, proliferation, and survival which stem from both metabolic and intracellular-signaling activity. Metformin decreases hepatic glucose production and reduces the bloodstream level and cellular uptake of insulin, which results in reduced activation of insulin receptors on cell membranes, triggering a cascade of intracellular molecular effects, which are often activated in many types of cancer cells, in addition to upregulation of AMP-activated protein kinase, a key molecule in glucose and insulin regulation and also an inhibitor of mTOR. **Results:** Treatment with Metformin has been associated in meta-analysis of case-control and cohorts with reduced breast, colon, and pancreas cancer risk, although RCTs confirmed the inverse association or showed no impact of metformin. It should be remembered that RCTs that find no association between metformin and cancer were designed to analyze other outcomes and did not include adequate confounding factors and follow-up was too short (maximum 4 years). Despite this evidence, the latest meta-analysis shows that metformin decreased risk only for cancers of the liver, pancreas, colorectal, and stomach. A meta-analysis of eight cohorts, involving 2805 pancreatic patients with diabetes, demonstrated a favorable result for pancreatic cancer with improved overall survival (hazard ratio = 0.78, 95% confidence interval = 0.66–0.92). Metformin treatment is associated with a significant reduction in overall mortality

irrespective of diabetes status in patients with endometrial cancer. The survival benefit suggests that diabetes screening and maintenance of good glycemic control with metformin may improve outcomes in endometrial cancer. **Conclusions:** Using metformin as a cancer prevention strategy has been controversial and the results have been inconsistent, but many analyses reveal that use of the drug is time-dependent, which may explain the disparity. Currently, doubt still remains whether the anticancer effects of metformin observed in *in vitro* and *in vivo* studies will ultimately translate into clinical benefits in the ongoing clinical trials. While whether Metformin has a clinically relevant chemopreventive or anticancer effect is not clear at present, the evidence from the ongoing human clinical trial studies will help answer this critical issue.

P9002. Impact of Weight Loss on Health-Related Quality of Life, as Measured By Short-Form 36 in the Scale Obesity and Prediabetes Trial of Liraglutide 3.0 Mg: Three-Year Data

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Background: Obesity has a negative impact on health-related quality of life (HRQoL), related to the severity of obesity. This *post hoc* analysis explored the impact of weight loss (WL), over 3 years, on HRQoL in people with prediabetes and obesity (BMI ≥ 30 kg/m²) or overweight (BMI ≥ 27 kg/m²) with hypertension and/or dyslipidemia. **Methods:** Participants were randomized 2:1 to once-daily SC liraglutide 3.0 mg ($n = 1505$) or placebo ($n = 749$) as adjunct to diet and exercise (NCT01272219). The Short-Form 36 version 2 questionnaire was administered in countries with validated translations (79% of participants). Data are reported as estimated change from baseline using ANCOVA with LOCF; increased scores signify improvement for both the physical component score (PSC) and mental component score (MCS). The analysis was stratified by categorical weight change from baseline. Results are reported for both liraglutide 3.0 mg and placebo, as follows: A = WL $\geq 15\%$; B = WL 10%–14.9%; C = WL 5%–9.9%; D = WL 0%–4.9%; E = weight gain. **Results:** Baseline characteristics (means) are as follows: 77.6% female, age 47.9 years, weight 108.2 kg, BMI 39.1 kg/m². A greater proportion of participants treated with liraglutide 3.0 mg versus placebo were in the higher WL categories: A = 10.9 versus 3.1%; B = 13.8 versus 6.8%; C = 24.7 versus 13.7%; D = 35.4 versus 37.3% and E = 14.9 versus 38.6%. Changes in PCS were highest in WL category A (6.15) and decreased with decreasing categorical WL: B = 3.99; C = 4.02; D = 2.50; E = 0.55 (based on both treatment arms). MCS scores were: A = 0.48; B = -0.30; C = -1.08; D = -0.79; E = -1.03. **Conclusions:** More participants achieved greater categorical WL after 3 years with liraglutide 3.0 mg as adjunct to diet and exercise versus placebo. With greater categorical WL, greater improvements in SF-36 PCS score were observed, corresponding to the 1-year data, while no consistent pattern was observed for MCS.

P9003. Impact of Prepregnancy Maternal Body Mass Index and Weight Gain during Pregnancy on Maternal and Fetal Outcomes in King Fahad Medical City

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Background: The objective is to compare the maternal and fetal outcomes of prepregnancy high body mass index (BMI) compared to average weight women and also to compare the maternal and fetal outcomes and difference in weight gain during pregnancy. **Methods:** This is a retrospective study carried out in Women Specialized Hospital, King Fahad Medical City. Pregnant women who fulfill the inclusion criteria divided into four groups according to their prepregnancy BMI as well as by categories of weight gain during pregnancy according to the Institute of Medicine guidelines for pregnancy. Data were analyzed by means analysis of variance for continuous variables and followed by least significant difference *post hoc* procedure to compare the mean differences between groups. Consent was obtained to conduct this research. **Results:** Total number of pregnant women included was 554, categorized normal 150, overweight 149, or obese and morbidly obese 155. Their gestational ages were over 38 weeks among all groups. 38.5 ± 0.18 in normal weight, 38.2 ± 0.23 in overweight, and 38.1 ± 0.21 in obese. There is significant relation between gravidity and obese (4.3 (0%–1%) and morbidly obese 4.6 (0–19). There is a significance ($P < 0.05$) between the maternal age and weight gain age; overweight (30.6 ± 5.3), obese (32.6 ± 5.5), and morbidly obese (32.3 ± 5.2). There is a significant relation between parity and obese (2.59, 0%–9%) and morbidly obese (2.82, 0%–11%). **Conclusions:** The study findings showed that obesity associated with maternal and fetal complications. Women of childbearing age should be encouraged to maintain a healthy BMI.

P9004. Metabolic Syndrome among the Young Obese in the United Arab Emirates

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Background: Obesity is the sixth major risk factor for the overall burden of disease globally and is associated with a constellation of metabolic derangements starting early in life. Features of metabolic syndrome (MS) were assessed among obese young individuals in the UAE. **Methods:** A total of 260 students were seen in the Obesity Clinic at the School Health Centre, after being identified through the School Health Screening Program. Of the 260 young people included in the study, 44 children (17%) were below 12 years of age. There were 153 boys and 107 girls. Majority were UAE nationals (70%), while the remaining was from the neighboring Gulf and Arab countries. **Evaluation Tools:** (1) Evaluation was carried out as part of the clinical assessment. (2) In addition, questionnaires were completed: Risk Assessment Questionnaire, Beck Depression Inventory. (3) We used the adolescent criteria (Cook *et al.*, 2003) modified from National Cholesterol Education Program Adult Treatment Panel III. **Results:** The rate of metabolic syndrome among obese school children attended the obesity clinic in Al Ain was found to be 44%. The rate of MS was significantly more among boys than girls ($P = 0.001$), i.e., M:F = 2:1. 94.5% of those with a diagnosis of MS revealed subjective psychological distress as compared to only 5.5% of those who did not receive a diagnosis of MS ($P = 0.033$). On the Beck depression rating scale, three quarters (76.9%) of those with MS scored above a score of 10 indicating the presence of significant depressive symptoms, as compared to 43.4% of those without MS ($P = 0.021$). **Conclusions:** We concluded that MS is highly prevalent among adolescent UAE adolescents who showed high score of depression symptoms. More efforts should be directed to increase skills and knowledge among pediatricians and GPs to identify this syndrome early. There is an urgent need to identify high-risk individuals and increase public awareness to

influence the components of the syndrome to decrease the risk of morbidity and mortality.

P9005. Early Weight Loss Responders to Liraglutide 3.0 mg had Greater Weight Loss, Regression to Normoglycemia, and Reduced Type 2 Diabetes Development at 3 Years versus Early Nonresponders: SCALE Obesity and Prediabetes

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Background: The SCALE Obesity and Prediabetes (NCT01272219) trial randomized adults with prediabetes and obesity (BMI ≥ 30 kg/m²) or overweight (≥ 27 kg/m²; with dyslipidemia/hypertension) to liraglutide 3.0 mg or placebo, adjunct to diet and exercise for 3 years. **Methods:** This *post hoc* analysis compared liraglutide 3.0 mg early responders (ERs; $\geq 5\%$ weight loss [WL] at week 16) and early nonresponders (ENRs; $< 5\%$ WL at week 16). Efficacy outcomes are estimated means in ERs ($n = 580$) and ENRs ($n = 210$) who completed 160 weeks' treatment. Development of type 2 diabetes/regression to normoglycemia was analyzed using the full analysis set with the last observation carried forward. Safety analysis was based on all individuals with an early response status. **Results:** Of those with week 16 data: for liraglutide 3.0 mg ($n = 1302$), 68.0% were ERs and 32.0% ENRs; for placebo ($n = 640$), 22.3% were ERs and 77.7% ENRs. At week 160, greater WL (8.6% and 9.1 kg in ER vs. 2.9% and 3.1 kg for ENRs), reduced proportions developing type 2 diabetes (0.5% ERs, 3.2% ENRs), greater regression to normoglycemia (69.8% in ERs, 55.4% in ENRs), and greater clinical and patient-reported improvements were observed in ERs to liraglutide 3.0 mg versus ENRs. Adverse events (AEs) and gastrointestinal AEs were similar between groups (87.1%, 75.3% for ERs; 95%, 71.6% for ENRs) while serious AEs and gallbladder disorders were more frequent in ERs (17.7% and 6.3% vs. 12.7% and 2.2% for ENRs). **Conclusions:** Among those treated with liraglutide 3.0 mg for 160 weeks, greater benefits were seen in ERs versus ENRs; overall AE rates were similar.

P1101. Jaundice Is a Presenting Sign of Thyrotoxicosis Crises

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Background: Jaundice and hepatic dysfunction have been reported in a patient with thyrotoxicosis crises and could be due to different mechanisms and to describe a case of jaundice occurring in patient with thyrotoxicosis crises and to illustrate the importance of early diagnosis and institution of thionamide when indicated. **Methods:** We present the clinical and laboratory features of a patient with a history of thyrotoxicosis for 2 years duration, she stopped medications last 8 months, so she present with jaundice and life-threatening condition of thyrotoxicosis crises and whose clinical condition improved remarkably following treatment with thionamides. **Results:** A

case report of a 40-year-old woman presented with jaundice, fever, diarrhea, vomiting, and dyspnea for 1-week duration. She had previous history of thyrotoxicosis without treatment. Liver function showed cholestatic type of jaundice. Our patient improved remarkably following treatment with thionamides. This suggests that thyrotoxic crises itself as the most likely cause for her clinical picture.

Conclusions: Thyrotoxic crisis is a life-threatening medical condition with adverse clinical picture that requires early diagnosis and treatment to reduce the associated mortality. Clinical and biochemical parameters and improvement on institution of thionamide suggest that hepatic dysfunction was primarily due to thyrotoxic crises.

P1102. Is Dirty Elbow an Early Presentation of Primary Hypothyroidism?

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Background: Thyroid disease is associated with changes in the skin while may sometimes be the first clinical sign. Hence, we report a case dirty elbow which characterized by abnormal darkening of the extensor surface of right elbow without any erythema or scaling; hypothyroidism is an unusual cause of dirty elbow. **Methods:** We report a case of a 65-year-old woman presented with a 1-month history of fatigue and malaise and become apparent that the patient has episodes of atrial fibrillation for 6 months with darkening of skin of her left elbow unresponsive to topical keratolytic and corticosteroids. Laboratory evaluation revealed an autoimmune thyroiditis with hypothyroidism. **Results:** Dirty elbow is a darkening of skin of elbow; other causes of dirty elbow were excluded. After hormonal replacement therapy, a gradual improvement of skin was observed. **Conclusions:** The diagnosis of dirty elbow due to hypothyroidism can be different task; however, it is a very rare association. Hypothyroidism must be suspected in patients with dirty elbow, particularly when it occurs in association with systemic symptoms.

P1103. Early Sialadenitis Postradioactive Iodine therapy for Differentiated Thyroid Cancer: Prevalence and Predictors

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Background: This study aims to identify risk factors for sialoadenitis in patients receiving radioactive iodine (RAI) for differentiated thyroid cancer (DTC), as well as to determine the prevalence of sialoadenitis and the characteristics of patients receiving RAI at our institution. **Methods:** This is a retrospective case-control study of patients admitted to receive RAI for DTC between January 1, 2012, and December 31, 2015. **Results:** There were 174 patients admitted to receive RAI, they were predominantly females (71.3%) with papillary thyroid cancer (93.1%), and the majority had lymph node involvement (64.5%). Pretreatment thyroid-stimulating hormone was >75 mIU/ml in most patients (72.6%). The prevalence of sialoadenitis was 20.1%. Being non-Lebanese and having positive, whole-body scan were associated with sialoadenitis and persisted after adjustments (odds ratio = 2.34 and 3.99). Non-Lebanese patients had higher rates of lymph nodes involvement ($P = 0.005$) and were kept off levothyroxine for longer periods ($P = 0.02$). **Conclusions:** The prevalence of sialoadenitis at our institution is similar to reported studies. Risk factors associated with the

development of sialoadenitis allude to more iodine exposure in the neck with positive whole-body scan, lymph node involvement, and delay in receiving RAI. Decreasing the interval between being off levothyroxine and receiving RAI may therefore be one measure in preventing its occurrence.

P1104. Congenital Hypothyroid by Homozygote Mutation of the thyroid-stimulating hormone Receptor Gene

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Background: Congenital hypothyroidism (CH) is a neonatal endocrine disease of genetic origin. It is due to a hormone synthesis disorder or dysfunction of the hypothalamic-pituitary axis. Permanent central CH associated with thyroid dysgenesis with hypoplasia of the gland is very rare ($<5\%$). It may be identified by mutations in the thyrotropin receptor gene (TSH-R). Our research aims at the genetic mutations of the TSH-R gene and to specify the homozygous (HO) or heterozygous character of this mutation. **Methods:** the TSH-R gene was analyzed in seven patients (5 families) by PCR, and then, the coding exons were sequenced to identify the genetic mutations. **Results:** we reported a new TSH-R inactivating mutation in a 16-month-old girl with severe stunting and psychomotor acquisition disorders. The thyroid balance shows a very high serum TSHs at 353 μ IU/ml T4 and T3 which are low at <1 pmol/L and <0.70 pmol/L respectively. Cervical ultrasound reveals a CH on dysgenesis with athyreosis and objective scintigraphy hypoplasia of the thyroid. Genetic analysis shows this new mutation of TSH-R in the state in its parents. Another HO mutation of TSH-R was observed in a 13-year-old boy 11 months with serum TSH increased to >50 μ IU/ml and a low T4L at 4.3 pmol/L, her 7-year-old sister having serum TSH increased to 36 μ IU/ml and T4L decreased to <2.6 pmol/L). Their parents have consanguinity with the mutation. Severe CH is due to resistance to TSH. **Conclusions:** this original work shows the presence of a new mutation with a deficit of the function of the TSH-R. The correlation exists between the severe clinical phenotype and the genotype. Thus, adequate management of patients can improve neurological, mental, and intellectual prognosis.

P1105. Prevalence of Thyroid Abnormalities among Adults with HIV Infection in Oman

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Background: Thyroid dysfunction is a common endocrinopathy in HIV and occurs in 35% of all HIV-infected adults. The aim was to find out the prevalence of thyroid abnormalities among adults with HIV infection in Oman. **Methods:** A retrospective cross-sectional design was used for the study. Adults with HIV infection attending the infectious disease clinic were selected from a public hospital in Oman. Ambulatory adults, 18–75 years of age, serologically documented HIV infection attending the ID clinic of the hospital were included in the study. EPR records were reviewed from January 2003 to

December 2015 for those with clinical data of at least one visit in ID clinic. TSH and free T4 were measured by sandwich ELISA method on Cobas analyzer. **Statistical Analysis Used:** Descriptive statistics were used for the analysis. **Results:** Among 151 patients with HIV, 50 patients (33.1%) had abnormal thyroid function. Of 105 males, 29 (27.6%) had abnormal thyroid function, while of 45 females, 21 (45.7%) had abnormal thyroid function. There were 85 (56.3%) patients with initial CD4 > 200 cells/uL and 66 (43.7%) patients with initial CD4 < 200 cells/uL. Among patients with initial CD4 > 200 cells/uL, 29 (34.1%) patients had abnormal thyroid functions compared to 21 (31.8%) with CD4 < 200 cells/uL. **Conclusions:** The prevalence of thyroid functional abnormalities is 33.1% among adults with HIV in this selected sample. Isolated low T4 followed by subclinical hypothyroidism was a common abnormality found in the study population.

P1106. Gynecomastia as a Harbinger of Graves' Hyperthyroidism with a Dose-related Carbimazole-Induced Myositis: Unusual Clinical Scenarios in the Same Patient

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Background: Gynecomastia is a well-recognized feature of Graves' hyperthyroidism; however, the first manifestation is of extremely rare. On the other hand, although carbimazole is relatively a safe medication, myositis has been reported as a very rare side effect. **Results:** A 46-year-old patient of Egyptian Nubian ancestry presented by painless bilateral gynecomastia in June 2016, no other manifestation gonadal dysfunction, and no history of drug or recreational agent use. In December 2016, he developed frank symptoms of hyperthyroidism included palpitation, excessive sweating, insomnia, and fatigue. In February 2017, he had suppressed TSH (<0.0001 mu/l), free T3 of 18.8 pmol/l and free T4 of 46 pmol/l (normal: 9–14), strongly positive anti-TPO antibodies, small smooth diffuse goiter, but no orbitopathy or acropachy. Symptoms improved remarkably after initiation of carbimazole in a dose of 50 mg od in addition to propranolol 40 mg tds. Eight weeks after initiation of antithyroid treatment, he presented with significant pain and discomfort of proximal muscles of shoulder girdle only with no involvement of hip girdles, with muscle tenderness but no clinical weakness, and normal neurology. Investigation revealed elevated muscles enzymes of both LDH and AST but normal CK, with negative inflammatory markers and autoimmune profile. Temporary cessation of carbimazole with subsequent re-introduction of carbimazole at reduced dose led to dramatic decrease in the level of muscle enzymes and complete resolution of symptoms. **Conclusions:** Gynecomastia as a presenting feature of hyperthyroidism is very rare. Thyrotoxicosis may lead to altered sex hormone ratio and hence the development of gynecomastia. Antithyroid drugs (ATDs)-related myositis has rarely been reported. The underlying pathophysiology remains unclear. Relative local muscular hypothyroid state (due to rapid thyroid hormone reduction), immune-mediated reaction, and/or direct effect of ATDs on muscles have all been suggested as possible mechanisms. Stopping or reducing the ATDs, with or without adding thyroxine, may lead to rapid resolution of symptoms. Our case highlights the need for considering hyperthyroidism in the differential diagnosis of bilateral gynecomastia even in the absence of other features of thyrotoxicosis.

P1107. The Association between Type 2 Diabetes Mellitus and Hypothyroidism: A Case–Control Study

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Background: Diabetes mellitus (DM) is one of the most common chronic diseases in the world. Saudi Arabia shows one of the highest percentages of diabetes globally, with an estimated number of 3.4 million cases in the country in 2015. The prevalence of diabetes mellitus in Saudi Arabia has reached 30% with an increase in both type 1 and type 2 DM. Patients affected by DM require continuous monitoring of blood glucose and multiple follow-ups to prevent the serious complications of diabetes mellitus which imposes a big burden on the country's economy and the health of the population as well. Recent literature showed some evidence of association between type 2 DM and the risk of developing thyroid dysfunctions including hypothyroidism. However, the evidence of this relation in the Gulf Region, especially Saudi Arabia, has not been adequately studied. Our aim is to study the association between type 2 DM and the risk of developing hypothyroidism in Western region of Saudi Arabia. The presence of an association may make it mandatory to screen type 2 DM patients for hypothyroidism and vice versa. **Methods:** This is a case–control study that was performed in the Department of Medicine at King Abdulaziz University Hospital, through record review from the Hospital Information System in the periods between January 2000 and February 2016. Cases were selected from files of the adult's endocrinology clinics and controls were selected from orthopedic clinics. **Inclusion Criteria for Cases:** Patients already diagnosed with hypothyroidism were selected randomly from the records of outpatient endocrine clinics. **Exclusion Criteria for Cases:** Those in whom the diagnosis of hypothyroidism was made before the age of 18 years and those diagnosed with type 1 DM were excluded from cases and controls to avoid possible confounding effect based on the reported association in the literature. Those who had a known cause for hypothyroidism were also excluded. After selecting cases, the records of the orthopedics clinics were stratified by age and gender and an equal group of controls was randomly selected to match the cases (group matching by age and gender). **Results:** Type 2 DM was found to be an independent risk factor for hypothyroidism with an odds ratio of 6.29 (95% confidence interval: 3.382–11.699). The association between type 2 DM with hypothyroidism persisted after adjustment for age and gender. Patients were classified according to thyroid function test results at the time of their attendance to the clinic into the type of hypothyroidism each patient had. There were no statistically significant associations between any of the types mentioned above. **Conclusions:** The significant association between hypothyroidism and patients with type 2 DM and the significant increase in complications among those patients warrant an urgent need to start thyroid screening for diabetic patients to detect hypothyroidism early and try to prevent the occurrence of any complications.

P1108. Papillary Thyroid Cancer with Pituitary Gland Metastasis: A Distinctly Unusual Clinical Encounter

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Background: Pituitary metastases (PMs) are found in about 1% of all pituitary resections. The common primary sites include breast, lung, and gastrointestinal tract carcinomas, with thyroid being an uncommon one. There are eight reported cases of

papillary thyroid cancer (PTC) metastasizing to the pituitary gland. PM typically presented late and in some instances years after the diagnosis of thyroid cancer. We report a case of PTC with synchronous presentation of PM. **Methods:** A 43-year-old male presented with a 2-month history of neck swelling. Fine-needle aspiration cytology confirmed thyroid cancer. He underwent total thyroidectomy. Histopathology revealed high-risk features with solid pattern and focal columnar cells. Tumor was 5 cm in size with extensive lymphovascular invasion, extrathyroidal extension, and involvement of bilateral cervical lymph nodes with extranodal extension. Postoperative course was complicated by findings of central hypothyroidism, adrenal insufficiency, and secondary hypogonadism. He had a prior history of reduced sexual function. He was treated with thyroxine, hydrocortisone, and testosterone followed by unmasking of diabetes insipidus requiring desmopressin. Magnetic resonance imaging of the pituitary showed a large bilobed sellar and suprasellar tumor with chiasmal compression. Visual field testing confirmed bitemporal hemianopia. Extensive lung metastasis was evident on chest X-ray. **Results:** Whole-body iodine¹²³ scan with single photon emission computed tomography demonstrated pulmonary and multiple skeletal metastases. It was however nonavid in the pituitary raising doubts about it being PTC metastasis. Transsphenoidal surgery was done with excision of sellar lesion. Histopathology confirmed metastasis from PTC. **Conclusions:** Our case is illustrative of aggressive variant of PTC with crucial metastatic pituitary mass that threatened vision with risk of pituitary apoplexy. This posed management challenges and dictated resection of pituitary lesion as a priority to radioiodine ablation (RAI). This approach prevented potential expansion of PM following RAI and preserved vision following surgery.

P1109. Pericarditis: Uncommon Onset of Antineutrophil Cytoplasmic Antibody-associated Vasculitis Induced by Methimazole

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Background: Antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV) drugs induced is a rare side effect of antithyroid drugs. It is more commonly associated with propylthiouracil (PTU). The clinical manifestations are polymorphic like in primary vasculitides but less severe; ranging from less specific syndromes to multiple organs injured and life-threatening in rare case. The cardiac involvement is uncommon. **Methods:** Hereby, we present the first case report of a 25-year-old woman with Graves' disease clinically and biochemically euthyroid on methimazole (MMI) 20 mg daily 1 year before. She developed a syndrome of pericarditis as first sign of ANCA associated vasculitis induced by MMI. **Results:** A 25-yr-old woman was admitted with a recent history of precordial pain and dyspnea. A Graves' hyperthyroidism was diagnosed 1 year before; she was clinically and biochemically euthyroid on MMI 20 mg daily 1 year before. The examination revealed blood pressure of 120/60 mmHg, pericardial rub, and no edema. GFR >60 ml/min/1.73 m and systemic/urine sediment showed no abnormalities. The chest radiography showed severe cardiomegaly. Echocardiography showed a moderate-to-severe pericardial effusion. Direct Coombs test was negative, C3 and C4 within the normal range, ANA was negative, ANCA was positive (1/300), with a p-ANCA pattern. Cryoglobulinemia was negative. Treatment was started with doses of steroids at 1 mg/

kg/day, and the patient's state starts to improve considerably. Two days after her admission, she developed necrotic-looking vasculitic skin lesions on bilateral lower extremity and on her right ear. Skin biopsy showed leukocytoclastic vasculitis. The MMI-induced vasculitis was suspected, so we stopped the offending treatment. In her follow-up, we noticed a progressive disappearance of the skin lesions and pericardial effusion. In light of clinical and laboratory findings, she was diagnosed leukocytoclastic vasculitis caused by MMI, with positive p-ANCA. **Conclusions:** The importance of this case is to call attention to the possible occurrence of pericarditis as a first symptom of ant thyroid drug-induced AAV.

P1110. Weight Loss, Cushing's Disease, and Two Tumors: The Conundrum of the diagnosis: which One of the Trios?

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A 77-year-old retired Scottish nurse was well up till last year and enjoyed cycling and gardening. She presented in January with generalized weakness and weight loss. She was known to have diabetes, IHD, and hypertension. Clinically, she was tanned, was overweight, and had thin skin, muscle wasting, and mild central obesity. Blood tests showed neutrophil leukocytosis and hypokalemic metabolic alkalosis. Computed tomographic (CT) scan of chest/abdomen and pelvis showed a 3.7 mm adrenal adenoma with intermediate features. 24-h urinary free cortisol, midnight serum cortisol, and postdexamethasone suppression cortisol were all significantly elevated. She failed to suppress cortisol following a low-dose dexamethasone suppression test. CRH tests suggested Cushing's disease. Pituitary profile showed raised ACTH and inappropriately low gonadotrophins. Pituitary magnetic resonance imaging showed a 4.7 mm nodule in keeping with a microadenoma. She was started on metyrapone and hydrocortisone. Subsequent PET scanning ruled out malignancy and confirmed an atypical but benign adrenal adenoma. Inferior petrosal sinus sampling confirmed central ACTH source. Repeat CT scan of adrenals did not show interval change. The patient underwent transsphenoidal hypophysectomy in August 2017. The procedure was uncomplicated. She is booked for postoperative tests at the end of September. In summary, this is a 77-year-old lady who presented with weight loss and hypokalemic metabolic alkalosis. Her initial presentation and profound hypercortisolemia suggested an ectopic source. CT showed a borderline adrenal lesion, but pituitary function and dynamic tests favored Cushing's disease.

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