musculoskeletal, metabolic, thrombotic, infectious and cardiovascular complications. The most common cause of CS today is the use of corticosteroid medications. It´s reported that more than 10 million American receive pharmacological doses of glucocorticoids each year. Case reports have shown that CS can be caused by non-systemic use of corticosteroids. **Clinical case:** A 53-year-old patient with past medical history of osteoarthritis who presented to outpatient endocrinology office for new onset facial swelling of 2 months. His PCP had attributed it to adverse effect of recent neck glucocorticoid injections and treated him with prednisone for 7 days without any relief. Subsequently, he was referred to Endocrinology due to concern about Cushing´s syndrome. The patient reported associated easy bruising and decreased libido. On further questioning, patient mentioned he had been receiving several epidural steroid injections in the neck, shoulders and back in the past. Per record review, from June to November 2018, he had received multiple triamcinolone and dexamethasone injections as follows: 10mg dexamethasone in each C4-5, C5-6 and C6-7 facet joints; 5mg triamcinolone injections in the right C4-5, C6-C7, left C4-5, C6 and C7, and 40mg of triamcinolone in C7-T1. The patient also reported he had multiple injections in 2019, but these records were not available. Physical exam showed hypertension, facial plethora, and scattered bilateral arm ecchymosis. Laboratory study showed hyperglycemia. Given suspicion for CS, further workup, including morning serum cortisol, ACTH, and 24-hour urine cortisol were ordered, which were 0.5 ug/dl (6.2-19.4 ug/dl), 4.3 pg/ml (7.2-63.3 pg/ml) and <2 ug/24 hours (5-64 ug/24 hours) respectively, suggesting iatrogenic CS secondary to corticoid steroid injection. Also, given that the patient reported lightheadedness, and decreased libido, cosyntropin stimulation test and free testosterone, FSH and LH were ordered to rule out adrenal insufficiency and hypogonadism respectively. Hypogonadism was ruled out, however, cosyntropin stimulation test showed peak cortisol of 12 and 16 mcg/dL at 30 and 60 minutes (>18 mcg/dL), suggesting adrenal insufficiency, due to suppression of endogenous cortisol production from exogenous glucocorticoid use. Patient was started on hydrocortisone and all glucocoirticoid injections were stopped. **Conclusions:** Many different non-systemic corticosteroid administrations can cause iatrogenic Cushing's Syndrome, and therefore, physicians should be thoughtful when prescribing steroids regardless of administration form.

# Diabetes Mellitus and Glucose Metabolism

## LIPIDS, OBESITY AND METABOLIC DISEASE

### *Exploring the Role of Brown Adipokines on Hepatic Insulin Resistance Using a Microfluidic Organ-On-Chip*

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**SAT-653**

The development of insulin resistance (IR) in liver is a key of pathophysiologic response in type 2 diabetes. Although insulin resistance impairs its ability to suppress hepatic glucose production, insulin regulation of lipogenesis is maintained (1). Currently available insulin sensitizers are effective at lowering glucose levels, but have significant adverse effect on weight gain due to triglyceride accumulation, which highlights a need to develop new therapeutic treatment options for type 2 diabetes. Brown adipose tissue (BAT) has been studied as a new target for anti-obesity and type 2 diabetes as BAT stimulation increases energy expenditure, reduces adiposity, and improves insulin sensitivity (2). However, the underlying mechanisms are not completely understood. To identify the role of BAT adipokines on hepatic insulin resistance, we developed an insulin resistant liver organ-on-chip model and then perfused primary mouse brown adipocyte conditioned media through the hepatocytes. Our results demonstrate that IR hepatocytes treated with brown adipocyte - conditioned media restores insulin sensitivity and improves glucose metabolism. This was verified by significantly increased expression of Phospho-Akt (Ser473) and glucose production gene markers (G6pc and PEPCK), lowered glucose production, increased glucose uptake, and increased glycogen synthesis in treated hepatocytes over IR group ($p < 0.05$). Our results also indicate that brown adipocyte - conditioned media treatment has the potential to suppress lipogenesis in hepatic insulin resistance. This was confirmed by significantly reduced expression of a lipogenesis gene marker (SREPB1) and fatty acid uptake in treated hepatocytes over IR group ($p < 0.05$). Current efforts are focused towards identifying the BAT adipokine via mass spectrometry. We conclude that BAT-derived endocrine factors could be a potential target for new drug discovery for obesity and type 2 diabetes treatment.

**Reference:** (1) Langlet et al. Cell. 2017 Nov;171(4):824-835. (2) Subhadraw et al. Am J Physiol Endocrinol Metlab. 2015 Jun;308(12):E1043-E1055.

**Nothing to Disclose:** NT, CL, AT, FZ, KK, JM, RC, AB

# Pediatric Endocrinology

## PEDIATRIC SEXUAL DIFFERENTIATION, PUBERTY, AND BONE BIOLOGY

### *Long-Term Safety and Efficacy of Leuprorelin in Treating Central Precocious Puberty: A Large, Open-Label, Multicenter, Phase IV Study in China*

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**SUN-094**

**Background:** Leuprorelin (Enantone®) is a gonadotropin-releasing hormone (GnRH) analogue used worldwide to treat central precocious puberty (CPP). This clinical trial aimed to evaluate the long-term safety and efficacy of leuprorelin in treating Chinese CPP children.

**Methods:** This is the first, prospective, open-label, and multicenter study conducted from 2015 to 2018, in China. As a large interventional study, it included a four-week screening period, a 96-week treatment period, and a four-week safety follow-up period. Eligible subjects were treated with leuprorelin subcutaneously once every four weeks for 96 weeks. At the beginning of the study, subjects whose body weight ≥20 kg received a dose of 3.75 mg and those <20 kg received a dose of 1.88 mg and then the dose was allowed to be adjusted during the study based on subject's condition and investigator's judgment. The primary endpoint was the incidence of adverse events during treatment, and the secondary endpoint was the percentage of subjects who had regression or no progression in Tanner stage at Week 96 compared with baseline.

**Results:** A total of 307 CPP patients from 11 Chinese medical centers received leuprorelin, of which 305 (99.3%) were girls and 2 were boys (0.7%), with a mean (±SD) age of 7.95±0.982 years and a mean height of 133.68±7.108 cm. Two hundred eighty-three (92.2%) patients completed the 96-week treatment period. Two hundred fifty-two patients (82.1%) reported treatment-emergent adverse events (TEAEs)—most of which (79.5%) were mild to moderate. Only 33 (10.7%) patients experienced TEAEs that were considered related to leuprorelin. The most frequent (>2%) drug-related TEAEs were injection site induration (4.6%, 14/307) and vaginal bleeding (2.3%, 7/305). After the 96-week treatment period, 83.5% female subjects had regression or no progression in Tanner stage compared with baseline (95% CI: 78.68%, 87.62%) and the 2 male subjects had progression of 1 point in Tanner stage genital score occurred at Week 12 and then remained stable throughout the study. By the end of the treatment period, the majority of subjects had decreased GnRH stimulated peak LH and FSH, as well as reduced sex hormone levels and bone age/chronological age ratio compared with baseline. The subjects also had increased predicted adult height and BMI after treatment.

**Conclusions:** This Chinese study demonstrated that CPP was effectively treated in most patients who received leuprorelin (Enantone®) for nearly two years. Any drug-related adverse events were reported with low incidence (<5%) and were consistent with the known safety profile of leuprorelin. Leuprorelin was shown to be well tolerated and effective in the management of CPP in Chinese patients.

# Neuroendocrinology and Pituitary

## PITUITARY TUMORS II

### *The Effects of Cabergoline in Pre-Surgical and Recurrence Periods of Cushing's Disease Patients*

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**MON-312**

**Background:** Dopaminergic agonist cabergoline (CAB) has been used in pharmacological treatment of Cushing's disease (CD). The effect is attributed to the frequent expression of subtype 2 dopamine receptor in corticotropic tumors. However, *in vivo* studies demonstrated normalization of urinary cortisol (UC) in about 30-40% of cases over the long term, mainly after surgical failure. **Objective:** To evaluate the effect of CAB as monotherapy in early preoperative period and on recurrence of Cushing's disease. **Methods**. A single-center retrospective study was conducted in a tertiary referral center. Twenty-one patients with confirmed CD were included. Median age was 32 years (13-70), 86% female, 10 with microadenomas, 11 with macroadenomas. They were diagnosed from 1986 to 2016 and used CAB as monotherapy either in the preoperative period (n=7, CABi) or in recurrence, before any other treatment (n=14, CABr). It was considered 'complete response' a 24h-UC normalization and 'partial response' a 24h-UC reduction >50%. UC was obtained on the last follow-up evaluation. Normalization of nocturnal salivary cortisol (NSC) on CAB was evaluated in most cases, as well as the larger tumor diameter by pituitary MRI, before and after CAB treatment. **Results:** Complete response was achieved in 29% (6/21) of subjects after 14.9±16.4 months of treatment with a mean dose of 2.2±1.0 mg/wweek. Partial response occurred in 9.5% (2/21). NSC normalized in 35% (6/17) and no variation in tumor diameter before and after CAB use was observed (n=13): 6.8±6.8 *vs*. 7.2±7.1 mm, respectively. There was no normalization of UC in CABi at the end of the treatment whereas in CABr, 43% (6/14) of patients reached complete response. CABi group was treated for 4.7±1.9 months and CABr was treated for 20.1±18.1 months. Both groups were on similar doses of CAB (CABi 2.1±0.9 and CABr 2.3±1.1 mg/w). Interestingly, the difference between the groups' complete response was evident early on 3 months of treatment: no cases in CABi *vs*. 60% (6/10) in CABr ($p$=0.035) despite a lower dose in CABr (1.0 *vs*. 1.5; $p$=0.008). Normalization of NSC occurred in 20% in CABi and 42% in CABr. **Conclusion**. Normalization of UC and NSC occurred in about 30% of total patients, mainly those who used CAB on recurrence of CD. Due to the small number of subjects in CABi group, the absence of hormone control in this group requires further investigation in order to verify the effectiveness of CAB as primary therapy or as preoperative treatment option.

# Thyroid

## THYROID CANCER CASE REPORTS I

### *MetastaticThyroidCancer*

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**SUN-489**

Background In many cases, thyroid cancer leads to metastasis; however, isolated metastasis to the liver from thyroid