balance, nausea, decreased appetite, feeling dehydrated and recent blood pressure readings in the 90s. Vitals on presentation were stable. An MRI, from 2 weeks ago, showed a slightly enlarged sella but no metastatic disease. The next day, he became hypotensive with minimal response to fluids and was started on Midodrine. However, considering his persistent hypotension, his cortisol level was checked and found to be profoundly low (<1). Literature review of his immunomodulator revealed the possibility of central adrenal insufficiency. In addition, he was noted to have a low TSH (0.02) with normal FT4 (1.08). Subsequently, his ACTH level was also found to be low (<1.5) which further elucidated a central cause for his adrenal insufficiency. Therefore, he was ultimately treated with PO hydrocortisone with plans to taper off in the next few weeks.
Conclusion: This case demonstrates a rare yet significant side effect of Nivolumab/Ipilimumab therapy. Timely diagnosis and therapy can alleviate symptoms due to associated hormonal deficiencies. Moving forward it will be interesting to see if starting prophylactic steroids or routine screening will allow us to diagnose pituitary dysfunction due to Nivolumab/Ipilimumab earlier.

Neuroendocrinology and Pituitary
NEUROENDOCRINOLOGY AND PITUITARY CLINICAL ADVANCES

A Clinical Audit on Diagnosis and Management of Hypopituitarism in Scarborough General Hospital

Santhosh Abraham, MBBS, MRCP(UK), MRCGP(INT)[1], Emmanuel Ssemmondo, MD[2], Anis Abobaker, MBBS, MSc, MRCPUK[2], David Humphriss, MD[2], Tadeusz Pawlak, MD[2].
[1]York teaching Hospital NHS foundation trust, Scarborough, United Kingdom, [2]York teaching hospital NHS foundation trust, Scarborough, United Kingdom.

Objectives: The main objective was to evaluate the use and compliance to the guidelines issued by the Endocrine Society in diagnosis and management of hypopituitarism and their impact on the clinical practice in Scarborough General Hospital (SGH). **Design:** A retrospective review of secondary data of patients with a diagnosis of hypopituitarism in SGH. **Methodology:** The data was collected from both patients' case notes and electronic medical records. Data analysis was performed using Microsoft excel. **Results:** 18 patients with the diagnosis of Hypopituitarism were identified. 5 patients were females and 13 were males. 11 patients aged between 60-80 years, 4 patients were between 51-60 years and 3 patients were between 31-50 years. All the patients had low cortisol levels; however, cortisol was checked at 9AM in only 4 patients. All the patients had their thyroid stimulating hormone levels checked, which were low in all of them. Free T4 levels were normal in 2 patients, and low in 16 patients. 17 patients had low follicular stimulating hormone levels, whereas 15 had low luteinising hormone levels. Testosterone levels were checked in 9 male patients out of which 7 had low levels. Insulin-like growth factor-1(IGF1) was done in all patients and levels were low in 10 patients. All those with low IGF1 had glucagon stimulation test. Serum sodium levels were low in 3 patients and high in 5 patients. Plasma osmolality was only checked in 8 patients (was high in 5 patients). Urine osmolality was checked in 10 patients, and it was low in 5 patients. Brain MRI was performed in 16 patients, and 2 patients had brain CT. The most common cause of hypopituitarism was non-functioning pituitary adenoma (44.4%), and the least common causes were empty Sella syndrome (5.6%) and craniopharyngioma (5.6%). All patients received glucocorticoid replacement therapy, 17 received thyroid hormone replacement therapy, 8 received testosterone replacement therapy, 3 received desmopressin (DDAVP) treatment, and one patient received growth hormone replacement therapy. **Conclusion:** This Audit shows that our practice in diagnosis and management of hypopituitarism is mostly in line with the recommendation of the Endocrine Society. However, cortisol levels were not always measured at 9:00 am and we are not compliant with performing Growth Hormone stimulation test in every patient.

Neuroendocrinology and Pituitary
NEUROENDOCRINOLOGY AND PITUITARY CLINICAL ADVANCES

A Cross-Sectional Study to Evaluate the Safety and Efficacy of the Insulin Tolerance Test

Ahmad Yehia Ghamlouche, Bachelor of Science in Education[1], Fouad Alzaroui, Bachelors in Science[2], Tamara Altaweel, M.B.ch. B[1], Adel Alwakeedi, MD[1], Hassan A. Khan, DO[3], Opada Alzohaili, MD[4].
[1]Metro Detroit Endocrinology Center, Dearborn, MI, USA, [2]Metro Detroit Endocrinology, Dearborn, MI, USA, [3]GARDEN CITY HOSPITAL, West Bloomfield Twp, MI, USA, [4]ALZOHAILI MEDICAL CONSULTANTS, MD PC, Dearborn, MI, USA.

Introduction: The insulin tolerance test (ITT) is the current standard for the diagnosis of pituitary diseases such as growth hormone deficiencies (GHD). Previous reports indicated that the ITT as having a high adverse event profile, and the cosyntropin test as being sensitive enough to diagnose GHD in adults. The purpose of this study is to validate the safety and efficacy of the ITT. **Design:** Over 400 ITT tests were conducted over the course of 3 years from (2017-2020) at our facility. This study is only focused on adult physiology (Cohort Age 16 - 78) and excludes any pediatric tests. An important measure, time spent in critical state (Tc), is done to know the expected time a patient is to remain hypoglycemic, both for patient expectations and clinician logistics. We did not use a CGM, instead drew blood samples on set intervals for glucose measurements. Since the measurements aren't continuous, a consistent overestimation is done for all subject encounters to capture the maximum time spent in hypoglycemia. Insulin like growth factor one (IGF-1) was measured before the test was conducted and is listed in the spreadsheet. Growth hormone peaks were and the time to reach that peak (Tp) were also measured. This time is calculated from the listed time of the first dosage of insulin to the time of the GH peak. Other measures listed in the spreadsheet include a brief medical history of the patient, their age, weight, gender, and the blood pressure and heart rate measured at test completion. Any immediate interventions such as intravenous fluid injections were listed. Symptoms of hypoglycemia are excluded as a complication of the test. This is due to the inherent nature of the ITT whose goal is to drop

one's blood sugar past normal ranges. **Results:** Our results show (0.45%) rate of adverse events. 2 patients in the entire cohort suffered from seizures during their hypoglycemic period. Both of them were successfully aborted with Ativan, and patients were monitored until recovery from post ictal state and discharged home with stable vitals and no acute symptoms. It was later discovered these patients had remote history of epilepsy and should've been excluded from this trial. Of the remaining 448 subject encounters, (20%) of them required urgent intervention to BP. Zero of those patients suffered any other symptoms or ongoing adverse effects. 5 patients underwent the ITT twice, again, with no adverse effects. **Conclusion:** No permanent adverse events or hospitalizations were reported. Based on our findings the clinical safety concerns of the ITT test are minimal compared with the benefit of obtaining an accurate diagnosis in this patient cohort, if done within the correct protocol. Using IGF-1 measures as a determinant of GHD is wildly inaccurate as seen in our results. Combining IGF-1 with the Cosyntropin test is not a good enough measure for diagnosing GHD. The ITT test remains the most accurate and reliable test available today.

Neuroendocrinology and Pituitary

NEUROENDOCRINOLOGY AND PITUITARY CLINICAL ADVANCES

Abnormal Pituitary Imaging and Associated Endocrine Dysfunctions in Erdheim-Chester Disease

Skand Shekhar, MD[1], Jorge A. Irizarry-Caro, MD[2], Ninet Sinaii, PhD[3], William Gahl, MD PhD[4], Juvianee I. Estrada-Veras, MD[4], Rahul Dave, MD PhD[5], Georgios Z. Papadakis, MD[6], Nicholas Patronas, MD PhD[7], Constantine A. Stratakis, MD, D(Med)Sc[8], Kevin O'Brien, MS-CRNP[4], Fady Hannah-Shmouni, MD FRCPC[2].

[1]NICHD and NIEHS, National Institutes of Health, Bethesda, MD, USA, [2]NICHD, National Institutes of Health, Bethesda, MD, USA, [3]Clinical Center, National Institutes of Health, Bethesda, MD, USA, [4]NHGRI, National Institutes of Health, Bethesda, MD, USA, [5]NHGRI, National Institutes of Health and Inova Fairfax VCU College of Medicine, Fairfax, VA, USA, [6]Department of Radiology, Medical School, University of Crete, [1003] Heraklion, Greece; [7]. Foundation for Research and Technology Hellas (FORTH), Computational Biomedicine Laboratory (CBML), [70013] Heraklion, Greece, Heraklion, Greece, [7]Department of Imaging Sciences, Clinical Center, National Institutes of Health, Bethesda, MD, USA, [8]NICHD, National Institutes of Health, Rockville, MD, USA.

Background: Erdheim Chester disease (ECD) is a rare histiocytic neoplasm associated with hypothalamic and pituitary infiltration and dysfunction. We determined the abnormal pituitary imaging (API) phenotypes in subjects with ECD and analyzed their associated endocrine dysfunctions. **Methods:** This was a cross-sectional examination of a natural history cohort study of 61 subjects with ECD performed at a tertiary care clinical research center. The diagnosis of ECD was based on clinical, molecular, and histopathological features. Enrolled subjects underwent baseline endocrine tests of anterior and posterior pituitary function in addition to pituitary imaging. The following variables were analyzed- age, sex, body mass index (BMI), *BRAF V600E*, hsCRP, ESR, pituitary hormone deficit number, diabetes insipidus (DI), and panhypopituitarism. Fisher's exact test or t-test/Wilcoxon tests compared patients with and without API. **Results:** Sixty-one subjects with ECD (age ±SD: 54.3 ±10.9, 46 (75.4%) males) were studied. The prevalence of API was 32.8% (n=20), who were younger than those with normal imaging (50.3 ±10.5 vs 56.3 ±10.7 yrs, p=0.042). The most common pituitary imaging abnormalities included thickened pituitary stalk (18.03%, n=11/61), followed by pituitary encasement, small pituitary and abnormal morphology (6.55%, n= 4/61 for each). A higher prevalence of DI (45.0% vs 9.8%, p=0.003) and panhypopituitarism (45.0% vs 4.9%, p<0.001), and a higher number of pituitary deficits (median (IQR): 2.0 (0-2.5) vs 0 (0-1.0), p=0.007) were noted in patients with API compared to those with normal imaging. Other biochemical markers were similar between both groups. **Conclusion:** Abnormal pituitary imaging was commonly seen in ECD and was also associated with a younger age and hormone deficits suggesting associations with pituitary structure-function.

Neuroendocrinology and Pituitary

NEUROENDOCRINOLOGY AND PITUITARY CLINICAL ADVANCES

Abnormal Sodium is a Predictor for Respiratory Failure and Mortality in Hospitalized Patients With COVID-19

Ploutarchos Tzoulis, MD, PhD, MSc (Hons), MRCP (UK)[1], Julian Waung, BM,BSC,MRCP[2], Emmanouil Bagkeris, MSc[3], Ziad Hussein, MBChB, MRCP[4], Aiyappa Biddanda, MBBS, MRCP[2], John Cousins, BSc (Hons)[2], Alice Dewsnip, MBBS, BSc[2], Kanoyin Falayi, MBBS[2], PW McCaughran, MBBS, BSc[2], Chloe Mullins, MBBS, BSc[2], Ammara Naeem, MBBS, MRCP[2], Munachiso Nwokolo, MBBS, BSc[2], Helen Quah, MBBS, BSc[2], Syed Rabha Bitat, MRCP (UK)[4], Eithar Deyab, MD, MRCP[4], Swarupini Ponnampalam, MBBS, MRCP (UK)[4], Pierre-Marc Gilles Bouloux, BSC,MD,FRCP[5], Hugh Montgomery, MBBS, BSc, FRCP, MD[1], Stephanie Baldeweg, MD FRCP[1].

[1]University College London, London, United Kingdom, [2]Whittington Hospital, London, United Kingdom, [3]Imperial College London, London, United Kingdom, [4]University College London Hospital, London, United Kingdom, [5]Royal Free Hospital, London, United Kingdom.

Background: Hypernatremia and hyponatremia (serum sodium > 145 mmol/L and < 135 mmol/L, respectively) are independent risk factors for excess mortality in patients with bacterial pneumonia. We sought, for the first time, an association of sodium [Na] abnormalities with mortality, need for advanced respiratory support and Acute Kidney Injury (AKI) in hospitalized patients with coronavirus disease 19 (COVID-19). **Methods:** This retrospective, longitudinal, cohort study included 488 adults, 277 males and 211 females, with a median age of 68 years, who were hospitalized with COVID-19 to two hospitals in London over an 8-week period (February to May 2020). **Results:** The in-hospital mortality rate was 31.1% with a medial length of stay of 8 days. High [Na] levels at any timepoint during hospital stay were associated with significantly increased mortality rate (56.6% vs 21.1% in patients who remained constantly normonatremic; odds ratio 3.05, 95%