showed a mixed cystic and solid nodule measuring 4.7 x3 x 4cm, with no calcification. Given the increased size of the lesion, her age, and difficulty breathing when supine, a decision was made to proceed with left hemithyroidectomy for definitive diagnosis and treatment. Pathology of the specimen revealed an encapsulated papillary thyroid carcinoma with focal capsular invasion. Right hemithyroidectomy was performed three weeks later, followed by I-131 ablation one month after surgery. The patient is currently doing well and euthyroid on thyroid hormone replacement therapy, with no evidence of disease. She is undergoing surveillance with ultrasound imaging and laboratory evaluation. **Conclusion:** This is a rare case of AFTN harboring papillary thyroid carcinoma. Although the majority of cases of AFTN are benign, an FNA was performed and was negative for malignancy. Due to an increase in size, new symptoms and ultrasound changes, surgery was performed and revealed the final diagnosis. The behavior of thyroid nodules in pediatric patients can be different than adult patients. Even though the majority of AFTN are benign, we should still keep malignancy in our differential when the nodule has a growth pattern, new US findings or patient develops worsening symptoms.

Diabetes Mellitus and Glucose Metabolism

CLINICAL AND TRANSLATIONAL STUDIES IN DIABETES

Melanocortin 4 Receptor Contributes to Glucose Homeostasis by Regulating Kidney Glucose Reabsorption via the Glucose Transporter GLUT2

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MON-639

Melanocortin 4 receptor (MC4R) is essential for normal body weight and food intake. Deficiency of MC4R causes obesity in humans and mice. While the function of MC4R is well established in appetite regulation, its direct role in glucose homeostasis is unclear. Humans and mice with MC4R deficiency exhibit hyperinsulinemia and insulin resistance; however, they remain protected from fasting hyperglycemia/diabetes. To determine the role of MC4R in glucose homeostasis, we performed oral glucose and intra-peritoneal insulin tolerance tests (OGTT / ITT) in male and female *Mc4r* knockout (KO) and wild type (WT) mice. Remarkably, *Mc4r* KO mice exhibited improved glucose tolerance compared to WT mice (Area under the curve for OGTT, male: 29,125±2,028 vs. 38,493±1,161 mg/dL.min; female: 36,322±1,100 vs. 49,539±1,911 mg/dL.min, $p<0.0001$). The improvement in glucose tolerance was despite insulin resistance in *Mc4r* KO mice (Plasma insulin, male: 9.9±1.7 vs. 0.7±0.1 ng/mL, female: 6.2±2.0 vs. 1.1±0.3 ng/mL, $p<0.05$; Area under the curve for ITT, male: 13,174±1,073 vs. 8,132±255 mg/dL.min; female: 13,927±1,253 vs. 7,506±267 mg/dL.min, $p<0.01$). Based on our previous findings from POMC deficient mice, we hypothesized that the improved glucose tolerance in the *Mc4r* KO mice is due to their elevated glycosuria (excretion of glucose in urine). To test this hypothesis, we challenged *Mc4r* KO and WT mice with oral glucose (250 mg) and collected their 24h urine to evaluate glycosuria. Indeed, the KO mice demonstrated elevated glycosuria compared to their WT littermates (Urine glucose, male: 284±48 vs. 0.4±0.03 mg/24h, female: 63.4±14 vs. 1±0.6 mg/24h, $p<0.002$). To assess molecular mechanisms underlying elevated glycosuria in *Mc4r* KO mice, we measured the gene expression and levels of the kidney glucose transporters GLUT1, GLUT2, SGLT1 and SGLT2. *Glut2* mRNA was reduced by~ 40% and the protein level was decreased by~ 20% in *Mc4r* KO mice compared to their WT littermates. The other glucose transporters remained unchanged. Altogether, our study demonstrates that MC4R contributes to glucose homeostasis by regulating kidney glucose reabsorption via GLUT2. These findings may explain why MC4R deficient mice or humans remain protected from diabetes despite their longstanding obesity and insulin resistance.

Neuroendocrinology and Pituitary

CASE REPORTS IN NEUROENDOCRINOLOGY BEYOND THE PITUITARY

Late Diagnosis of ACTH-secreting Pulmonary Neuroendocrine Tumor by Repeated ^{68}Ga Dotatate Pet/ct: Influence of Tumor Size in Abnormal Uptake?

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MON-250

Background: ^{68}Ga DOTATATE PET/CT (^{68}Ga-PET) has been proposed as a superior method in identifying ectopic ACTH syndrome (EAS). However, recent systematic review suggests its sensitivity is not as high as believed (1). We report a challenging case of EAS whose source was uncovered only after repeated ^{68}Ga-PET. Clinical Case: A 15-year-old male presented with rapid onset of typical features of Cushing's syndrome (CS) and metabolic impairment. Hormone evaluation confirmed severe ACTH-dependent CS. Pituitary transsphenoidal surgery was performed due to positive responses in desmopressin stimulation and high dose dexamethasone suppression test, in addition to a 4 mm nodule in pituitary MRI. No tumor was found in surgical specimen and no hormonal improvement was observed after surgery. Inferior petrosal sinus sampling demonstrated no central to peripheral ACTH gradient. Neck US, thorax/abdomen/pelvis CT were negative and PET-CT/FDG was inconclusive. OctreoScan® identified anomalous uptake on left mediastinum and led the patient to a thoracic surgery (TS) with nodule resection at left hilum. Pathology confirmed ACTH positive 10 mm neuroendocrine tumor (NET) infiltrating a lymph node. The patient had transient clinical and hormonal improvement, with recurrence 7 months later. Thoracic CT (T-CT)

showed a 7 mm nodule on inferior segment of superior left lobe, PET-CT/FDG and OctreoScan® were negative but abnormal uptake was verified by ^{68}Ga-PET in subcarinal area. A sub centimetric lymph node was resected and pathology confirmed ACTH positive NET, although the patient did not achieve remission. Octreotide LAR, cabergoline and ketoconazole did not control hypercortisolism and bilateral adrenalectomy was performed. Then, T-CT showed stable lung nodule and 2nd ^{68}Ga-PET was negative. One year later, T-CT evidenced growth of lung nodule to 15 mm and 3rd ^{68}Ga-PET demonstrated for the first time, abnormal uptake in this area. The patient underwent resection of left superior lung lobe along with ipsilateral hilar lymph nodes, and histopathology study revealed an ACTH-secreting atypical pulmonary carcinoid tumor with Ki67 of 10% and 5 out of 11 lymph nodes affected. ACTH fell from 288 to 64 pg/mL after surgery. Conclusion: Despite the high sensitivity attributed to ^{68}Ga-PET, false negatives have been reported. In the present case, primary tumor was evidenced by ^{68}Ga-PET seven years after the first resection of a metastatic lymph node, in the 3rd ^{68}Ga-PET assessment and after tumor growth. This adds to the evidence that further studies are needed to better assess the accuracy of ^{68}Ga-PET for EAS. Reference: [1] Varlamov *et al*. Diagnostic utility of Gallium-68-somatostatin receptor PET/CT in ectopic ACTH-secreting tumors: a systematic literature review and single-center clinical experience. Pituitary 2019; 22:445–455

Tumor Biology

ENDOCRINE NEOPLASIA CASE REPORTS I

Ga68 Dotatate Detects Ectopic ACTH Secreting Atypical Carcinoid Tumor

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SUN-904

Title Ga68 DOTATATE detects Ectopic ACTH secreting Atypical Carcinoid tumor Introduction Ga-68 DOTATATE PET/CT has been shown to have a significant impact in localizing Ectopic ACTH secreting tumors especially those that are not identified on conventional imaging (CT, MRI). We present a person with a tumor that was reported benign (on biopsy) elsewhere but was found to be the source of the Cushings syndrome and was localized on Ga-68 DOTATATE PET/CT, pathology confirming atypical carcinoid tumor after surgical excision. **Discussion** She was a 63-year-old who presented with a severe proximal myopathy, high urinary free cortisol- 911.6 (µg/day) (<45), elevated ACTH 104(<63), and negative Inferior Petrosal Sinus Sampling. The CT scan demonstrated a small nodule at the right lung base. Axial Ga-68 DOTATATE PET images demonstrated radiotracer activity in the lesion, SUV max of 7.15. Fused Coronal Images showed a 1.9 cm radiotracer avid nodule, that was detected in the medial segment of the right middle lobe. The patient underwent a pulmonary wedge resection. H and E stain of the tumor -Immunohistochemical stains demonstrated that the tumor was strongly positive for synaptophysin and INSM-1 (markers of neuroendocrine differentiation) and the mitotic count was up to 2–3 mitoses per 10 high-power fields, supporting diagnosis as an atypical carcinoid tumor. The patient had significant improvement of symptoms post excision. Somatostatin Receptor (SSR) based tracer Ga-68 DOTATATE PET/CT has a reported sensitivity for detection of 50 % in occult neuroendocrine tumors (NET), with an overall sensitivity of 64 % in a systematic review. It has been shown in retrospective reviews to help with clinical management both at initial diagnosis as well as follow up of Ectopic Cushings in approximately 65% of the cases. SSR analogue tracers like DOTATATE have been noted to be slightly better than FDG PET/CT at localizing ACTH producing bronchial carcinoids while small-cell lung cancers and other aggressive tumors are better visualized on FDG PET. The favorable aspect of Ga-68 DOTATATE includes great tumor to background ratio and the half-life of Gallium 68 that is suitable for transport and delivery. Metastatic NET in conjunction with ectopic Cushing syndrome can be also be treated with peptide receptor radionuclide therapy using either 90Y-DOTATOC and 177Lu-DOTATATE (both SSR based) resulting in improved clinical outcomes.

Thyroid

THYROID CANCER CASE REPORTS I

A Coexisting of Two Different Thyroid Malignancies: A Collision Phenomenon

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SUN-488

A Coexisting of Two Different Thyroid Malignancies: A Collision Phenomenon Introduction: Collision tumors are rare clinical entities wherein two histologically distinct tumor types occur at the same anatomic sites. Simultaneous papillary thyroid carcinoma (PTC) and follicular thyroid carcinoma (FTC) of the same thyroid is a very rare occurrence with limited clinical information. Herein, we report a case of PTC and FTC of the same thyroid lobe. **Clinical case:** A 79-year-old man presented to the emergency department for evaluation of left hip pain of 2-month duration. Three days before presentation, he sustained a physical trauma to the left side of his body. X-ray imaging of the left femur revealed a lytic bony lesion measuring approximately 5.2 cm x 4.2 cm at the proximal end of left femur as well as a displaced pathologic fracture of its lesser trochanter. Biopsies of the bone lytic lesion suggested metastatic follicular thyroid carcinoma. CT of the neck revealed an enlarged thyroid with a cystic lesion as well as 2 nodules in the left lobe of thyroid gland. Total thyroidectomy was performed. Histopathology revealed 2 separate primary malignancies of PTC and FTC. Following diagnosis, laboratory test results showed TSH 2.6 uIU/mL (reference range, 0.2–4), anti-thyroglobulin antibody (anti Tg) < 1.0 IU/mL (reference range, 0.0–0.9), calcitonin 8.4 pg/mL (reference range, 0–8.4), and CEA 1.1 ng/mL (reference range, 0.0–3.0). The patient was placed on thyroid hormone replacement therapy and was treated with external beam radiation to his bone metastasis. He was scheduled