most important given the propensity for metastases. Thus, we recommended the SDHx germline mutation package.

• Clinical Lesson

This case is the second reported synchronous bladder paraganglioma and prostate cancer. It highlights the challenge, lack of data, and need for advancement in our knowledge for the best management of incidental, non-functioning, extra-adrenal paragangliomas.

Neuroendocrinology and Pituitary

ADVANCES IN NEUROENDOCRINOLOGY

Nutritionally-Induced Alteration in KNDy Neuronal Expression in the Arcuate Nucleus of Ewes

Ligia D. Prezotto, PhD[1], Clay A. Lents, PhD[2], Dale A. Redmer, PhD[3], Anna T. Grazul-Bilska, PhD[3], Jennifer F. Thorson, PhD[1].
[1]Nutritional & Reproductive Physiology Laboratory, Northern Agricultural Research Center, Montana State University, Havre, MT, USA, [2]USDA, ARS, U.S. Meat Animal Research Center, Clay Center, NE, USA, [3]Department of Animal Sciences, North Dakota State University, Fargo, ND, USA.

SUN-LB54

Kisspeptin, neurokinin B, and dynorphin are imperative for GnRH/LH pulsatility and reproductive cyclicity. Neurons co-expressing these neuropeptides, KNDy neurons, within the arcuate nucleus of the hypothalamus (ARC) are positioned to integrate energy balance signals from neuronal and glial cells. Energy balance mediates neurokinin B expression in the ARC and LH pulse amplitude. Dynorphin mediates progesterone negative feedback on GnRH neurons. The hypothesis that the number of KNDy-expressing neurons in the ARC of ewes during the luteal phase of the estrous cycle is influenced by energy balance was tested using ovary-intact, mature ewes fed to lose, maintain, or gain body weight. Fluorescent multiplex immunohistochemistry was employed to identify and quantify neurons expressing a single neuropeptide and co-expressing kisspeptin, neurokinin B, and dynorphin in the ARC. Kaminski et al. (1) reported previously that concentrations of insulin and leptin differed between ewes fed to achieve different body weights and that ewes fed to gain body weight had increased concentrations of progesterone in the luteal phase of the estrous cycle. Moreover, tanycyte density and cellular penetration into the ARC are increased in ewes fed to gain body weight (2). Number of neurons in the ARC expressing kisspeptin (14.9 ± 2.7 neurons, 20.9 ± 3.6 neurons, and 51.5 ± 3.3 neurons in ewes fed to lose, maintain, and gain body weight, respectively), neurokinin B (21.5 ± 3.2 neurons, 31.3 ± 4.3 neurons, and 56.0 ± 3.9 neurons in ewes fed to lose, maintain, and gain body weight, respectively), and dynorphin (10.1 ± 2.4 neurons, 14.9 ± 3.2 neurons, and 33.1 ± 2.9 neurons in ewes fed to lose, maintain, and gain body weight, respectively) protein was increased ($P < 0.0001$) in ewes fed to gain body weight. Number of KNDy neurons in the ARC expressing kisspeptin, neurokinin B, and dynorphin protein was decreased in ewes fed to lose body weight (1.0 ± 0.5 neurons; $P = 0.01$) and increased in ewes fed to gain body weight (6.7 ± 0.6 neurons; $P = 0.0005$) when compared to ewes fed to maintain body weight (3.3 ± 0.7 neurons). These findings suggest that expression of kisspeptin, neurokinin B, and dynorphin protein in the ARC during the luteal phase of the estrous cycle may be influenced by nutritionally-induced alterations in circulating concentrations of progesterone that drive changes in morphology and density of tanycytes. Moreover, these results demonstrate that changes in KNDy neurons within the ARC occur as an adaptation to energy balance, potentially regulated divergently by metabolic milieu.

References: (1) Kaminski et al., Theriogenology. 2015 83:808-16. (2) Prezotto et al., Domestic Animal Endocrinology. 2020 Accepted.

Bone and Mineral Metabolism

BONE AND MINERAL CASE REPORTS II

Lithium: The Culprit of Multiple Endocrinopathies

Alice Yau, MD, Gul Bahtiyar, MD, MPH, Giovanna Rodriguez, MD, Jose R. Martinez Escudero, MD.
Woodhull Medical Center, Brooklyn, NY, USA.

MON-LB65

Background: Lithium, commonly used to treat various psychiatric disorders such as bipolar disorder, can cause acute toxicity that presents with nausea, vomiting and diarrhea. Lithium can also cause life-threatening endocrine abnormalities, including hypercalcemia, hypernatremia, and both hypo- and hyperthyroidism.

Clinical Case: A 61-year old female with hypothyroidism, bipolar disorder, hyperparathyroidism with two-gland parathyroidectomy on lithium for over 30 years presented with altered mental status.

Initial labs revealed elevated creatinine 1.92 mg/dL (0.8-2.00mg/dL) compared to baseline 0.82 mg/dL, sodium 154 mg/dL (135-147 mg/dL), Corrected calcium 11.7 mg/dL (8.5-10.5 mg/dL), PTH 96 pg/mL (15-65 pg/mL), and high lithium levels 1.45 mmol/L (0.60-1.20 mmol/L). Further studies showed hypotonic polyuria with no increase in urine osmolality after desmopressin, consistent with nephrogenic diabetes insipidus. Lithium was held and she was treated with aggressive intravenous hydration with dextrose 5% water.

Hypercalcemia is thought to result from increased secretion of PTH due to an increased set point at which calcium suppresses PTH release; this often resolves once lithium is stopped. Lithium can also unmask previously unrecognized mild hyperparathyroidism, and/or raise serum PTH concentrations independent of calcium levels.[1] The drug interferes with the kidneys' ability to concentrate urine in the collecting tubules by desensitizing response to antidiuretic hormone, causing diabetes insipidus. The resulting volume depletion from excessive urinary water loss in turn lead to acute kidney injury and hypernatremia.[2] Hypothyroidism results from lithium-inhibited synthesis and release of thyroid hormones and decreases iodine trapping.

Conclusion: Although these are infrequent complications of lithium use, they remain pertinent clinical findings to consider due to their morbidity. In this case, our patient may have avoided multiple chronic electrolyte abnormalities leading to altered mental status if lithium toxicity had been recognized earlier.