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HYPERCALCEMIA: A PRACTICAL APPROACH

Calcium derangements are frequently encountered in veterinary practice as in the emergency room and the ability to prioritize the abnormalities, determine likely etiology and provide treatment are important for the clinician.

Calcium is important in many cellular function and serves a vital role in normal homeostasis. It has a principal role in contraction of skeletal, cardiac, and smooth muscle; nerve function; regulating enzyme activity; coagulation as well as for maintaining the body's skeleton.

The majority of calcium (99%) is stored within the skeletal tissue as hydroxyapatite while the remaining 1% of calcium exists in the extracellular fluid (ECF) in three forms. Bone acts as a reservoir for calcium, releasing it or storing it as required.

As mentioned before calcium is found in three forms in the plasma: protein bound (chiefly to albumin); chelated to lactate, citrate or bicarbonate, and unbound or ionized. The ionized fraction (iCa) accounts for approximately 50% of the ECF calcium, protein-bound up to 35 % and the complexed about 10%.

The ionized fraction is the biologically active form and fairly tightly controlled within normal limits.

An understanding of this controle of calcium homeostasis is pivotal to working out etiology of the change in calcium for each individual.

The major regulators of calcium balance include parathyroid hormone (PTH), calcitriol, and calcitonin and the organs involved in this controle are the kidneys, gastrointestinal tract, and bone. PTH will increase renal resorption of calcium, increase bone resorption, and increase synthesis of calcitriol via the kdneys. Calcitriol increases serum calcium through increased intestinal uptake, but also through mobilisation of calcium from bone. Increasing calcitriol and calcium concentrations exert negative feedback on PTH production keeping the calcium concentration in the normal range. Calcitonin is synthesized by the C cells in the thyroid gland and prevent excessive increases in iCa by reducing osteoclast function on bone resorption.

Most laboratory analyzers report total calcium and although the measurement of total calcium can provide information about disturbances in the calcium homeostasis, it is the ionized calcium that is more useful to interpret.

Some of the most clinical signs with hypercalcemia include: polydipsia and polyuria, anorexia, lethargy, dehydratation, weakness, vomiting and tremors.

Hypercalcemia can develop secondary to various disorders in dogs and cats. In dogs, the most common cause of hypercalcemia is related to neoplasia, whereas in cats this is the third most common cause.

The most common causes of hypercalcemia and an algorithm for the work-up of these patients, witch can be exhaustive and expensive, will be provided in this lecture. Therapy for hypercalcemia is aimed at treating the underlying cause and promoting Ca excretion.