

Hypercalcemia

micro drip study guide

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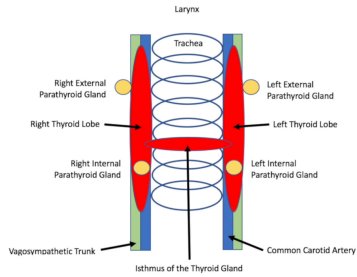
Function & Control

- Ca^{2+} has 2 principal physiologic functions
 - Insoluble Ca^{2+} salts → structural characteristics of bones
 - Soluble Ca^{2+} ions → biochemical intracellular & extracellular functions
- 50% protein-/complex-bound & 50% ionized
- Multiple organs involved in Ca^{2+} metabolism
 - Parathyroid glands, kidneys, skeleton, intestinal tract
- Multiple hormones involved in Ca^{2+} metabolism
 - Parathyroid hormone (PTH), vitamin D, PTH-related protein (PTHrP)

Insoluble calcium salts provide the structural characteristics of bones. On the other hand, soluble calcium ions are essential for a variety of intracellular and extracellular functions. Approximately 50% of calcium is bound to proteins or other complexes circulating through the body while the other 50% circulates in the ionized form.

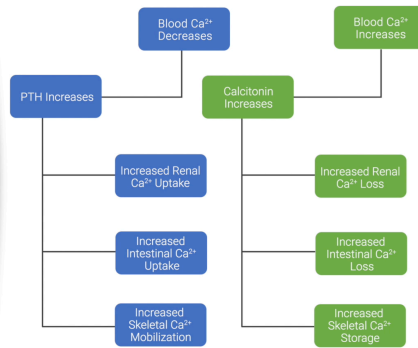
Multiple organs are involved in calcium metabolism, most notably the parathyroid glands, kidneys, the skeleton, and the intestinal tract. And of course several hormones are involved with calcium metabolism, including parathyroid hormone, vitamin D, parathyroid hormone related peptide or protein.

Function & Control



I think it's important for everyone to be familiar with basic parathyroid and thyroid gland anatomy. So we have the trachea and on either side of the trachea we have each thyroid lobe. At the cranial aspect of each thyroid lobe is an external parathyroid gland. At the caudal aspect of each thyroid lobe, we have an internal parathyroid gland.

Function & Control



Let's take a moment to review what happens in the body when blood calcium either decreases or increases. When blood calcium decreases the body increases the production and secretion of parathyroid hormone. The result of this increased production and secretion; increased renal calcium uptake, increased intestinal calcium uptake, and increased mobilization of skeletal calcium.

On the other hand, when blood calcium increases the body makes more calcitonin. The result of this increased production and secretion of calcitonin? Increased renal loss of calcium, increased intestinal loss of calcium, and increased storage of calcium within bones. There are so many potential causes of hypercalcemia in dogs and cats.

There are also many mnemonic devices that have been used over the years to help veterinarians remember all of those important differentials. For dogs, it's important to remember that the number one cause of hypercalcemia is neoplasia. Cats on the other hand, are a little bit different. The number one cause of hypercalcemia in cats is idiopathic.

Other important differentials to consider include hyperparathyroidism, hypoadrenocorticism or Addison's disease, both acute kidney injury and chronic kidney disease, and granulomatous diseases. This is a graph that I put together for you to detail the expected hormone changes in some of the more common diseases associated with hypercalcemia.

Feel free to reference this chart as you work through the diagnostic investigative process for a patient documented to have persistent hypercalcemia.