

# Hypocalcemia

## (Low Levels of Calcium in the Blood)

### Basics

#### OVERVIEW

- “Hypocalcemia” is a low total (bound and ionized) serum calcium concentration in the blood, it is the reduced ionized portion that is available to the tissues, and is the cause of clinical signs
- “Parathyroid hormone” (also known as “parathormone” or PTH) is produced by the parathyroid glands; it regulates calcium and phosphorus levels in the blood—it normally increases calcium levels by causing calcium to be reabsorbed from bone
- The “parathyroid glands” are small, hormone-secreting glands that are located on or near the thyroid glands; thus the name, as “para-” refers to “adjacent” or “alongside” and “thyroid” refers to the thyroid gland; the thyroid and parathyroid glands are located in the neck, near the windpipe or trachea

#### SIGNALMENT/DESCRIPTION OF PET

##### Species

- Dogs
- Cats

#### SIGNS/OBSERVED CHANGES IN THE PET

- Signs of underlying disease may be seen without clinical signs of low levels of calcium in the blood (hypocalcemia), because the latter do not occur until total serum calcium falls below 6.7 mg/dL
- Seizures
- Muscle trembling, twitching, or involuntary contractions of groups of muscle fibers (known as “fasciculations”)
- Wobbly, uncoordinated or “drunken” appearing gait or movement (known as “ataxia”) or stiff gait
- Weakness
- Panting
- Vomiting
- Lack of appetite (known as “anorexia”)
- Fever
- Slow heart rate
- Cataracts in pets with low levels of parathyroid hormone (known as “hypoparathyroidism”)

#### CAUSES

- Low levels of parathyroid hormone produced by the parathyroid gland (known as “primary hypoparathyroidism”); parathyroid hormone regulates calcium levels in the blood—it normally increases



calcium levels by causing calcium to be reabsorbed from bone; “primary hypoparathyroidism” refers to a condition in which the glands do not produce adequate amounts of parathyroid hormone, resulting in a decrease in calcium levels and an increase in phosphorus levels in the blood

- Low levels of parathyroid hormone (hypoparathyroidism) secondary to surgical removal (known as “thyroidectomy”) of the thyroid glands or other corrective treatments for excessive production of thyroid hormone (known as “hyperthyroidism”) and subsequent parathyroid gland damage
- Hypoparathyroidism secondary to ultrasound-guided parathyroid gland radiofrequency heat ablation (for treatment of hyperparathyroidism or parathyroid masses) and parathyroid gland damage
- Kidney failure
- Ethylene glycol (chemical in many types of antifreeze) toxicity
- Oxalate toxicity (possible cause includes eating plants [such as lilies, philodendron])
- Sudden (acute) inflammation of the pancreas (known as “pancreatitis”)
- Complication of pregnancy or nursing (known as “eclampsia”)
- Phosphate-containing enemas
- Nutritional secondary hyperparathyroidism, caused by diets that have too much phosphorus and/or too little calcium and vitamin D—it is a type of malnutrition
- Abnormal absorption of calcium from the intestines
- Low levels of magnesium in the blood (known as “hypomagnesemia”)
- Citrate toxicity (after multiple blood transfusions)
- Rickets (disease caused by vitamin D deficiency)
- Syndrome characterized by sudden (acute) destruction of tumor tissue (known as “acute tumor lysis syndrome”)

## **RISK FACTORS**

- Complication of pregnancy or nursing (eclampsia)—usually seen in small-breed dogs during the first 21 days of nursing a litter
- Following corrective procedures for treating excessive production of thyroid hormone (hyperthyroidism) and excessive production of parathyroid hormone (hyperparathyroidism) where the parathyroid gland may be damaged

## **Treatment**

### **HEALTH CARE**

- Inpatient treatment for pets with clinical signs of low levels of calcium in the blood (hypocalcemia), in which underlying disease requires support
- Emergency treatment usually is only needed for certain pets (such as those with primary hypoparathyroidism, hypoparathyroidism secondary to hyperthyroid or hyperparathyroid corrective procedures and subsequent parathyroid damage, complications of pregnancy or nursing [eclampsia], recent phosphate-containing enema administration, citrate toxicity, and ethylene glycol toxicity)
- Long-term treatment usually is needed only to treat primary hypoparathyroidism
- If the pet has eclampsia, remove puppies from the mother dog (bitch) and hand-nurse, until weaned

### **ACTIVITY**

- Depends on condition and underlying cause

### **DIET**

- Diet change recommended in pets with nutritional secondary hyperparathyroidism, caused by diets that have too much phosphorus and/or too little calcium and vitamin D—it is a type of malnutrition; change diet to a balanced diet, also diet change is recommended in long term kidney disease

## **Medications**

- Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

### **EMERGENCY TREATMENT**

- Calcium gluconate 10% solution—administered slowly through a vein
- Calcium chloride 10% solution—also effective; administered slowly through a vein; extremely caustic if it gets outside of the vein and into tissues surrounding the vein; more potent than calcium gluconate

## **SHORT-TERM TREATMENT IMMEDIATELY AFTER EMERGENCY TREATMENT**

- Following emergency use of calcium gluconate 10% solution, relapse of clinical signs can be prevented by use of one of the following: constant-rate intravenous infusion; administration of calcium gluconate diluted in saline three-to-four times daily under the skin (subcutaneous administration), not normally needed for eclampsia

## **LONG-TERM TREATMENT OF HYPOCALCEMIA**

- See “Hypoparathyroidism” handout

## **Follow-Up Care**

### **PATIENT MONITORING**

- For pets requiring long-term treatment for low levels of calcium in the blood (hypocalcemia), bloodwork (serum calcium concentration) should be assessed in 4–7 days following initial treatment, then if pet has normal calcium levels, repeat bloodwork monthly for the first 6 months, then every 2–4 months; more frequent monitoring may be necessary if calcium levels are low
- Goal of treatment is to maintain serum calcium concentration between 8 and 10 mg/dL on bloodwork

### **POSSIBLE COMPLICATIONS**

- Low levels of calcium in the blood (hypocalcemia) recurrent

### **EXPECTED COURSE AND PROGNOSIS**

- Depend on underlying cause
- Recurrence of low blood calcium (hypocalcemia) following calcium administration is common until the underlying cause is addressed; monitoring of clinical signs and serum calcium levels are indicated

## **Key Points**

- “Hypocalcemia” is a low total serum calcium concentration in the blood
- Signs of underlying disease may be seen without clinical signs of low levels of calcium in the blood (hypocalcemia), because the latter do not occur until total serum calcium falls below 6.7 mg/dL
- Goal of treatment is to maintain serum calcium concentration between 8 and 10 mg/dL on bloodwork