

Hypercalcemia

What is hypercalcemia?

Hypercalcemia means that the level of calcium in the blood is abnormally high. (hyper = above or excessive; -emia = blood).

Why is calcium important?

Calcium is a mineral that is found in small quantities throughout the body. It plays an important role in such diverse and vital functions as muscle contraction, transmission of nerve impulses, blood clotting, and bone growth.

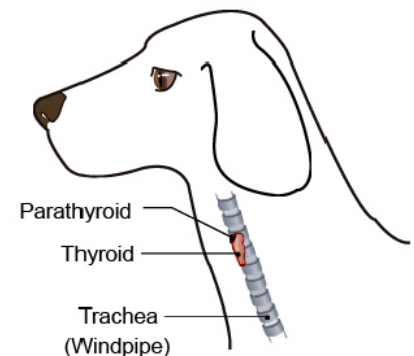
How is calcium measured?

Calcium is present in the blood stream in two forms, and is measured by two different methods. One method measures *total calcium*, while the other measures *free* or *ionized* calcium. Total calcium is simpler to measure, and is often used to provide a preliminary estimate of calcium levels; if hypercalcemia is detected, then ionized calcium will often be measured to look at the calcium level more closely.

How are levels of calcium controlled in the healthy animal?

"Calcium levels are controlled by the *parathyroid glands*..."

Calcium levels are controlled by the *parathyroid glands*; these small glands are closely associated with the thyroid gland, which is just below the larynx or "voice box". The parathyroid glands monitor the level of calcium in the blood stream. When calcium levels are too low, the glands release a hormone called *parathyroid hormone*, which acts to return calcium levels to normal. One of the many ways parathyroid hormone does this is to work together with Vitamin D to promote calcium absorption from the intestine.



Why is having high calcium bad for my pet?

High calcium levels may signal the presence of serious underlying disease including kidney failure, adrenal gland failure (called *Addison's disease*), parathyroid gland tumor, and some types of cancer. Pets with abnormally high calcium levels may show signs of illness such as weakness, listlessness, increased drinking and urination, and loss of appetite. In some pets, prolonged hypercalcemia may contribute to formation of bladder or kidney stones.

What further testing is required if my pet has high calcium levels?

If a blood test reveals your pet has high *total calcium*, the result should be confirmed by repeating the test. The pet will need to be fasted for 12 hours prior to re-testing in order to eliminate any dietary effects on the result. A test to measure albumin (a blood protein) should be performed at the same time to make sure the pet is not dehydrated, since this may alter the interpretation of the total calcium level. An *ionized calcium* test may be recommended by your veterinarian, either as an alternative to repeat testing of total calcium, or as a definitive test to confirm high blood calcium levels.

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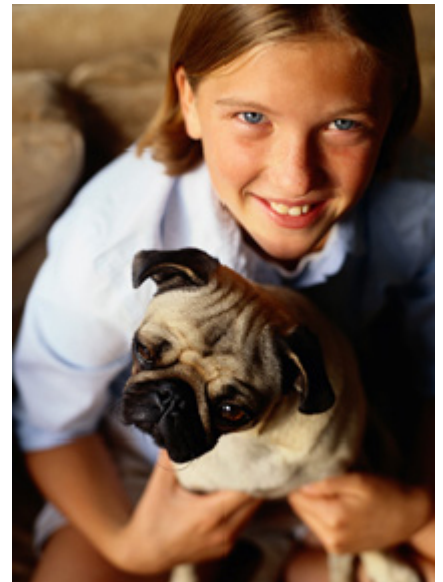
Once persistent hypercalcemia has been confirmed, the challenge is to identify the underlying cause. This will involve blood tests to determine the health of the kidneys, the adrenal glands, and, most importantly, the parathyroid glands. If there is a history of Vitamin D supplementation, testing for levels of this vitamin may also be performed.

Why is measuring Parathyroid Hormone important?

Since the parathyroid glands are responsible for controlling calcium levels, measuring the amount of parathyroid hormone in the blood stream is an important way to find out if the parathyroid glands are working properly. The level of parathyroid hormone (PTH) also provides important information about possible causes for hypercalcemia.

If a pet has both hypercalcemia and high levels of parathyroid hormone, then a disease called *hyperparathyroidism* is present. There are two main types of hyperparathyroidism: one form is caused by a tumor in the parathyroid glands, and is called *primary hyperparathyroidism*. The other form is associated with either longstanding kidney disease or poor nutrition, and is called *secondary hyperparathyroidism*.

If a pet has hypercalcemia but has low levels of parathyroid hormone, then it suggests there has been a breakdown in the normal mechanism that controls calcium levels. This is worrisome because it may mean that there is underlying cancer. The pet should be thoroughly examined, and additional diagnostic tests may be recommended, including radiography, ultrasound, cytology or biopsy.



"If cancer is suspected, then a specialized blood test can be performed..."

If cancer is suspected, then a specialized blood test can be performed that measures a substance called *parathyroid hormone-related protein*. This hormone-like substance is produced by some cancers, and it acts like parathyroid hormone even though it is distinctly different from the normal hormone. If this substance is found in high levels in the blood, then underlying cancer is likely present.