

THE PET HEALTH LIBRARY

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Diabetic Ketoacidosis

Ketoacidosis is one of the most extreme complications of diabetes mellitus that can be experienced. Unfortunately, most cases of ketoacidosis are in patients that were not previously known to be diabetic so the owner (and pet) must deal with two serious diagnoses: one acutely life-threatening and expensive and the other requiring on-going commitment and daily treatment.

Ketoacidosis represents an extreme metabolic derangement. Stress of some sort, usually some kind of infection, inflammatory disease, or pancreatitis creates a severe loss of glucose regulation. The cells are starving for glucose and, even though there is plenty of glucose in the blood, without insulin this glucose cannot enter the cells. In response to the starving body, all stored fuels are mobilized including fats. The extreme fat burning situation leads to the production of ketone bodies. When ketone bodies are burned for fuel, pH and electrolyte imbalances occur and the patient's life is at risk. Shock and dehydration are only part of this body-wide crisis.

Nausea and appetite loss with marked listlessness is typically what the owner notices; prior signs of diabetes (excess thirst, appetite and weight loss) may have been ignored or unnoticed but at this point the pet is clearly very ill. Blood glucoses are typically extremely high, and ketones can usually be detected in the urine.

What to Expect in the Hospital

The sooner the crisis is noticed, the faster treatment can be instituted. Because electrolytes can change moment by moment, blood testing is necessary throughout the day to keep track and keep the imbalances corrected. A facility that offers 24-hour care is ideal. Aside from the monitoring required to manage the ketoacidosis, testing to determine the precipitating stress is necessary as well.

*In dogs, the most common precipitating/concurrent conditions are: **pancreatitis**, **urinary tract infection**, and **Cushing's disease**.*



Intravenous Fluids

Fluid therapy is felt to be the key to treatment of this condition. The patient is invariably dehydrated from the high circulating blood sugar levels, which cause excess fluid loss in urine, as well as from vomiting and/or diarrhea, which are common in ketoacidosis. Aside from simply providing fluids, the IV fluid provides a vehicle by which other metabolic derangements can be repaired.

Insulin

Blood sugar must be controlled if treatment is to be successful but to prevent brain damage, blood sugar levels must be dropped slowly. To achieve this, "regular insulin" (typically Humulin R®) is used, given either as multiple intramuscular injections or as a continuous drip. This type of insulin is short acting and wears off quickly, which allows it to provide small adjustments. It is not until the patient is eating and nausea has been controlled that maintenance insulins can be started.

Potassium

Patients in ketoacidosis are greatly depleted in potassium. While insulin is needed to control blood sugar, insulin makes the problem worse by driving potassium into the body's cells and out of the bloodstream. Typically, high amounts of potassium must be supplemented in the intravenous fluid solution.

Phosphorus

Low levels of phosphorus also accompany diabetic ketoacidosis and if levels drop too low, the patient's red blood cells will begin to burst and be unable to maintain integrity. Phosphorus is also supplemented through the intravenous fluid solution.

Blood pH

The term ketoacidosis implies that the blood pH is overly acidic. If the situation is severe enough, sodium bicarbonate must be added to the intravenous therapy.

All these aspects require regular monitoring, which means lab work perhaps four times daily or more. Patients in diabetic ketoacidosis require close monitoring and intensive care.

When urine dipsticks no longer test positive for ketones and the patient is eating well and in good spirits, he or she is able to go home and be managed as a regular diabetic. Diet, monitoring, insulin etc. will be on-going concerns. Ideally, Ketostix, obtainable from any drug store, will be used at home to monitor for ketones to head off problems before they become extreme in the future.

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