

Look to lactate to help predict ill cats' prognoses, vet study says

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Many factors go into evaluating the prognosis of a critically ill animal, usually involving a combination of objective metrics, such as blood pressure or blood oxygenation, and more subjective clinical signs, such as alertness or lethargy.

Seeking another reliable objective indicator, researchers from the University of Pennsylvania School of Veterinary Medicine performed a retrospective study of [cats](#) treated in the intensive care unit of Penn's Ryan Hospital. In cats with low [blood](#) pressure, the researchers found that animals with a normal level of lactate, a byproduct of metabolism under low-oxygen conditions, were more likely to survive to discharge than those with high lactate levels.

"With critically ill cats, it can sometimes be difficult to accurately determine a prognosis," said Deborah C. Silverstein, an associate professor in the Department of Clinical Studies at Penn Vet and senior author on the study. "No one is ever going to look at a patient that appears really sick and happens to have a normal lactate level and say it has a good prognosis, but I think what this study tells us is that lactate is a very helpful measure to take into consideration and help complete a picture of how a cat might do."

The research, led by fourth-year veterinary student Emily K. Shea, was published in the *Journal of the American Veterinary Medical Association*. Stefan C. Dombrowski of Rider University joined Shea and Silverstein as a coauthor and statistician.

Cats in the [intensive care unit](#) frequently develop low blood pressure due to their illnesses, and that can lead to insufficient oxygen levels in the organs. Lactate is produced in conditions where oxygen is limited, so high levels can indicate that a patient's organs are not receiving adequate oxygen.

"Animals and people with low blood pressure often have trouble moving oxygenated blood to tissues," said Shea. "That's why it makes sense that, when it goes up, it's a dangerous place to be. You don't want to not be perfusing your organs. That could lead down a path of going into organ failure and therefore having a poor prognosis."

A previous study by Silverstein and colleagues had shown that, in dogs with [low blood pressure](#), normal lactate levels carry a survival benefit. Human studies have found similar results.

To find out if the same held true for cats, the researchers combed through hundreds of medical records from client-owned patients treated in Ryan Hospital, looking for animals that had a blood pressure reading below 90 mm Hg, an established measure of hypotension, and that had also had their lactate measured within an hour of that reading. They excluded cats with diagnosed or suspected cancer, as certain cancers produce lactate.

The resulting 39 cases included cats with kidney, respiratory, gastrointestinal and cardiac disease, among other illnesses. In addition to looking at blood pressure and lactate measures, the researchers noted other factors about each case, such as the cats' age, body weight, duration of hospitalization and packed cell volume, a measure of the blood's capacity to carry oxygen. They found no significant correlation between any of these variables and high lactate levels.

They did find, however, that cats with high lactate levels were

significantly less likely to survive to hospital discharge. The median blood lactate concentration of the six cats that survived was half that of the 33 that were euthanized or died naturally, 2.3 mmol/L versus 4.5 mmol/L.

An additional analysis, known as a Kaplan-Meier survival curve, revealed that hypotensive cats with normal lactate had a five-day survival rate of 57 percent, compared to 17 percent in cats with high lactate concentrations.

The authors acknowledge the limitations of a retrospective study; for example, in some cases lactate was measured only once, and [blood pressure](#) may have been measured before or after the lactate measurement. In addition, many of the animals were euthanized, complicating the survival curve.

"A big part of making the decision to euthanize is what we feel the animal's prognosis is, but there are always financial and other personal constraints that play into that decision," Shea said.

A future prospective study, the researchers note, would help firm up the conclusions of this initial work.

Yet having [lactate](#) as another indicator of prognosis can only be useful for clinicians, as well as pet owners, the authors said.

"The more information we have about the likelihood of an animal eventually being discharged is useful for both of us," Silverstein said. "That way we know how to use our resources best, the owners know how to spend their money wisely and the animals can hopefully have a good quality of life after they go through this brief period of illness."

More information: Emily K. Shea et al, Survival analysis of

hypotensive cats admitted to an intensive care unit with or without hyperlactatemia: 39 cases (2005–2011), *Journal of the American Veterinary Medical Association* (2017). [DOI: 10.2460/javma.250.8.887](https://doi.org/10.2460/javma.250.8.887)

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