

THE MICROBIOME AND DIARRHEA



We are only just beginning to understand the intricate system of bacteria that live inside the intestinal tracts of humans and animals. Every individual has a unique population of bacteria that is influenced by genetics, diet, the environment, past illnesses and medications.

The numbers and types of bacteria in the microbiome fluctuate with diarrhea but we can't always tell if that is a cause of diarrhea or an effect of diarrhea. Laboratory testing can identify and measure how many of which types of bacteria are in there but there is a great deal of variation from pet to pet. Telling abnormal from normal is difficult. The gastroenterology laboratory at Texas A & M's veterinary school has a test for dysbiosis (disturbance of the microbiome) that can be helpful in some cases. It takes 10-14 days to get results back, so it's not very helpful in-the-moment, but it's a useful test for chronic diarrhea in dogs. Antibiotic treatment can make diarrhea better in some pets but worse in others.

Sometimes we can identify the overgrowth of a specific type of disease-causing bacteria, such as Clostridium, but we don't always know if that's what is causing the diarrhea or whether the diarrhea came first and led to conditions under which the Clostridium could reproduce better. Antibiotics, like diet trials, are usually part of any diarrhea treatment initially, and we find the best one for the pet by trial and error. Some pets need to continue antibiotics long term in order to keep diarrhea-causing bacteria under control. These are usually very narrow-spectrum antibiotics. Our goal is to kill just enough bacteria to keep the system in balance, without killing off too many "good" bacteria.

Diarrhea can be food-responsive, or improve with a change of diet – but we can't predict which type of diet change will help an individual pet. Low-fat and low fiber diets, such as I/D, are helpful for certain causes of diarrhea but other times a diet with soluble fiber, which is a pre-biotic and supports the growth of beneficial bacteria, works better. If food allergy is a factor then the pet needs a hypoallergenic diet. We don't have any tests that will indicate what will likely work best, so we figure it out with trial and error. 45-60% of pets with diarrhea will improve on a new diet but the question is always "Which one?"

The intestines are long tubes with distinct layers of cells that perform different functions. The outside layer is structural, the middle layer holds immune system cells and the inner layer is lined with cells that absorb nutrients from the liquified food passing through. The mucous layer that lines the intestinal walls separates bacteria from the deeper layers of the intestinal lining.

If the lining cells are damaged and cannot produce enough mucous, bacteria are able to attach to the intestinal lining cells and then invade beyond the lining. When this

happens, a patient needs antibiotics. If the mucous layer is intact, we probably don't need to use antibiotics and would do better to give a probiotic instead. To know this requires a colonoscopy with biopsy, however. If we could easily see this or test for it somehow we would be much better able to tailor our treatment to be exactly what the patient needs. As it is now, we are guessing whether to use an antibiotic, a probiotic or both.

Our guesses have consequences. When we treat a pet with antibiotics, whether for diarrhea or for any other infection, it can take weeks or months for the microbiome to recover. Sometimes things never go completely back to normal. In human infants, antibiotic treatment leads to higher risk for obesity, and in adults they can be a trigger for Crohn's disease. We don't really know whether we could inadvertently be triggering diseases with antibiotics in pets. It may be happening all the time and we just don't understand the link yet. We don't use antibiotics if we don't need to – but some pets require them.

Hang in there if your pet has diarrhea. It can take some experimentation and testing to figure out what works best for an individual patient. We will do our best to get the problem under control as quickly as we can!

Watch our Youtube video on this topic at <https://qrco.de/bcdt1A>

