

# Pet Bird Research: PDD

3rd April 2014 by [Susan Orosz, PhD, DVM, Dipl ABVP \(Avian\), Dipl ECZM \(Avian\)](#)



*Dr. Susan Orosz and Giacomo Rossi, DVM, Ph.D., at the AIVPA conference in Rome.*

This was an intense few days with a small group of veterinarians from around the globe! All of us convened in Rome, Italy to discuss diseases of the gastrointestinal tract. Part of the time was spent listening to each other lecture with simultaneous translation at the Italian veterinary conference, AIVPA. I came to learn more about PDD and I must say that I learned a lot to help guide me to work with this disease. But let me digress ...

On the first day, I listened to some of the best veterinary clinicians and researchers of dogs and cats discuss inflammatory bowel disease (IBD) of dogs and cats. Most of the day was spent with lectures in simultaneous translation about the pathophysiology of this disease. I, like the Italian veterinarians, listened well into the night as each discussed the process from their perspective. It seems that how inflammation starts is not well understood but often can be at least helped with diet change to less inflammatory foods. This is parallel to the information being brought forward on inflammation as the cause of a number of human diseases as well- from arthritis to inflammatory bowel disease of humans.

While pathologists demonstrate that in the lining of the intestinal tract, lymphocytes and plasma cells accumulate with IBD, why they show up is not well understood. The research has centered on untangling the

response of the immune system in this situation. In the past, researchers have ignored the bacteria of the gut but now are tying them to the inflammatory process. Studies have looked at the types and the quantity of bacteria along the length of the GI tract in humans and in dogs. This collection of bacteria is called the microbiome and it has its own ecosystem set up along the GI tract. In fact, the ecosystem of one dog or person is different than the other one but there are similarities that are being analyzed.

The use of these new techniques looks at the genes of the bacteria to help quantify and determine the types of bacteria present. This has revolutionized the understanding of what is happening in the GI tract of healthy and sick individuals as they vary tremendously. This comparison is useful to figure out what is happening with inflammation. We know that the microbiome changes with those animals and humans with inflammatory bowel disease, and we can speculate that using these same techniques in birds with PDD will also help us to understand the disease and offer new ways of treatment.

In parrots with PDD, there are changes to the intestinal flora or the microbiome that I have observed doing gram stains of my patients for 30 years. In these gram stains, there are more gram negative rod type bacteria with accumulating anaerobic bacteria in birds with PDD. I often observe Clostridial spores on these fecal and choanal gram stains so I know that the GI tract is not mixing and moving properly. How does that occur?

### **Normal Digestion Interrupted**

The stomach of birds consists of the proventriculus, isthmus, and ventriculus or the gizzard. The proventriculus is the proximal portion and is the glandular portion that secretes the digestive enzymes. There is a narrow isthmus or intermediate portion followed by a saclike to highly muscular gizzard depending on the species. The gizzard grinds the food particles making it more readily available for the proteolytic enzymes to digest the food. In psittacines, there is a rotatory motion of the food in the stomach with food moving from the proventriculus to the ventriculus for grinding and then back into the proventriculus where the enzymes are secreted.

This normal pattern is disturbed by a variety of disease processes with the most noted being PDD. The small intestine includes the duodenum

(descending and ascending limb), jejunum, and ileum. Birds have a limited length to the small intestine and have a unique peristalsis-retroperistalsis pattern to mix the food stuffs, digest and absorb nutrients. But, when it does not mix properly, there is a change in the microbiome. This translates to the changes observed on fecal gram stains. When the fecal gram stains change back to normal, I know that the treatment protocol developed for that individual patient is working for them.

Why then does this happen with PDD? We now know that the first thing that happens in this disease is the leakage of glycoproteins from the nerve cells, particularly from the nerves of the first portion of the GI tract. This information was found from the studies from Dr. Giacomo Rossi's lab – the person who arranged for all of us to meet in Rome. His studies show that, while avian bornavirus often causes this leakage, the symptoms of the disease do not come from the virus directly but from these leaked proteins. In his studies, he was able to recreate the disease symptoms by just taking these glycoproteins and injecting them into birds that were negative for the virus.

The interesting thing is that leakage of these proteins tends to concentrate in the nerve cells of the tenth cranial nerve or the vagus nerve. Guess what? The vagus nerve supplies the first part of the GI tract of birds – the area where we see the symptoms. And just like all of the dogs and cats with inflammatory bowel disease, there is accumulation of lymphocytes and plasma cells but in the case of our bird friends, in the areas of the nerve cell bodies. That explains why the GI tract does not mix properly and when it does not, it causes these changes that we observe on the gram stains. We understand that with dogs and cats with IBD, the underlying problems are from changes in the immune system. We believe that the same thing is happening to birds with PDD. It is more like an autoimmune disease. So it would be much better to describe this disease with a much different name- Avian Autoimmune Ganglioneuritis (AAG)!

Now how then can we help our patients? We know that changing the microbiome back toward normal helps with the symptoms but often there can be flare ups in dogs and cats and the same holds true for our avian patients with AAG. By gram staining and helping rid the GI tract of the anaerobic bacteria and the Clostridial spores with antibiotics, we can start the process. We can also dampen the immune response with the use of celebrex to reduce the accumulation of inflammatory mediators. While we

haven't used immune suppressive agents, that may be part of the protocol in the future.

When we sat down as a group in Italy, we were committed to work together to solve these inflammatory diseases of the GI tract. We thought through some ideas, and I am sure in the coming months will finalize research protocols to investigate new approaches to treat these diseases. I am so thankful that birds were included in the study group and that I could be part of the team. To that end, Drs. Rossi, Bob Dahlhausen, and the research groups from Texas A&M and other institutions are going to convene before the start of the AAV annual conference this August to discuss their research with AGG. Our goal is to help our wonderful birds lead a better life!



### **About Susan Orosz, PhD, DVM, Dipl ABVP (Avian), Dipl ECZM (Avian)**

Susan Orosz, Ph.D., DVM, Dipl. ABVP (Avian), Dipl. ECZM (Avian) Dr. Orosz is a board-certified specialist in avian medicine and surgery, both in the United States (ABVP, Avian) and in Europe (ECZM, Avian). She is known internationally through the advances made for the health care of birds, books and articles she has written, and her lectures to veterinarians and bird owners alike.

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