Although an ACVIM consensus statement is under way, there are currently no guidelines for the use of acid suppressants in dogs and cats. This is the direct result of a lack of prospective studies investigating the use of acid suppressants in dogs and cats with acid-related disorders or diseases in which gastric hyperacidity is thought to be a sequela. As a result, acid suppressants are often inadequately dosed or used for diseases in which they are unlikely to be beneficial. There is preliminary and anecdotal evidence to support the use of acid suppressants in dogs and cats with gastroduodenal ulceration, reflux esophagitis, and exercise-associated gastritis. Proton pump inhibitors (PPIs; e.g., omeprazole, esomeprazole, pantoprazole) are the treatment of choice for these conditions. Veterinary studies suggest that omeprazole dosed at 1 mg/kg twice daily is more effective than once-daily dosing for raising intragastric pH and treating gastroduodenal ulceration. Esomeprazole, in combination with a pro-motility drug, dosed prior to induction has also been demonstrated to be an effective empirical treatment for reduction of anesthetic-induced reflux in dogs.

The Use of Acid Suppressants for Anticipated Gastric Hyperacidity
To the author’s knowledge, there are no prospective studies evaluating the efficacy of acid suppressants for dogs and cats with organ failure, inflammation, and other extra-gastrointestinal conditions in which gastric hyperacidity is a suspected contributor to morbidity. Despite this lack of evidence, acid suppressants are used commonly for renal and liver disease, pancreatitis, thrombocytopenia, and critical illness.

Gastric ulceration may be an anticipated sequela of end-stage renal disease in human patients. Urea is a substrate for the urease-producing bacterium, *H. pylori*. *H. pylori* colonization is more common in humans than veterinary patients. Therefore, acid suppression in combination with treatments for the eradication of *H. pylori* are often recommended for human patients with advanced kidney disease. Moreover, gastric mineralization, gastric gland atrophy, and hypergastrinemia, but not *H. pylori* colonization or ulcerative or erosive gastropathy, are typically documented in dogs and cats with advanced renal disease. There are no published studies evaluating continuous intragastric pH in cats and dogs with chronic kidney disease (CKD). Therefore, the necessity of acid suppressant therapy in small animal patients with CKD is unknown. An intragastric pH study in cats with CKD is currently under way in the author’s laboratory. Results of this study, which may support the use of acid suppressants for cats with chronic kidney disease, will be shared during this presentation. At present, the author administers acid suppressants to dogs and cats with advanced renal disease especially those who are anorexic, vomiting, or have evidence of GI bleeding (e.g., melena, severe iron deficiency anemia).

Liver disease is reportedly one of the most common predisposing factors for ulceration in dogs with the duodenum being a common site of ulceration. However, a study performed in dogs demonstrated no difference in serum gastrin between dogs with liver disease and healthy controls. Continuous intragastric pH monitoring and histopathologic examination of the gastrointestinal tract were not performed. The contribution of gastric hyperacidity versus compromised hemodynamics to GI bleeding and the efficacy of acid suppressants as preventatives for ulcerative disease in cats and dogs with liver disease requires further study. However, acid suppression may be considered for feline and canine patients with advanced liver disease at risk for ulceration. Cimetidine, however, should be avoided due to an association with acute liver injury in people.

The use of acid suppressant therapy for patients with pancreatitis is controversial. There are scattered case reports describing a causal association of acid suppressants with acute pancreatitis in humans; however, larger studies have had mixed results. PPIs have also had mixed results in experimental animal and in vitro studies. Some of these reports suggest that PPIs are anti-inflammatory and reduce pancreatic secretions whilst others demonstrate no effect or suggest a pro-inflammatory effect of PPIs. Pantoprazole possesses free radical scavenger activity and ameliorates inflammation in rodent models of pancreatitis; however, a recent placebo-controlled study failed to demonstrate a benefit to pantoprazole administration in human patients with acute pancreatitis. Acid suppression is warranted for companion animals with pancreatitis and persistent vomiting to prevent esophageal mucosal injury. However, the beneficial effect of acid suppression in dogs and cats with pancreatitis but without persistent vomiting is unknown. Until such studies are performed, judicious use of acid suppressants in dogs and cats with pancreatitis is recommended.
There is little evidence to support the use of acid suppressants to control thrombocytopenia-induced GI hemorrhage in human patients likely because platelet transfusions are more readily available. Additionally, there are reports of PPI-induced thrombocytopenia in humans, therefore PPI therapy may be contraindicated in these patients. However, available case reports describe the successful treatment of gastric bleeding using octreotide and omeprazole in a myelodysplastic patient with thrombocytopenia and prednisone and omeprazole in an idiopathic thrombocytopenia purpura patient. § Maintaining an intragastric pH > 6.8 is required to promote platelet aggregation and clot formation in patients with GI bleeding. § Some studies performed in healthy dogs and cats using omeprazole, pantoprazole, or famotidine at currently recommended doses did not maintain this degree of acid suppression for a prolonged period. § More studies are necessary to determine the efficacy and optimal dose of acid suppressants for the treatment of thrombocytopenic-induced GI bleeding in dogs and cats.

Critically ill human patients are at an increased risk for developing stress-related mucosal bleeding and gastritis secondary to several risk factors including breakdown of the gastric mucosal barrier, ischemia and reperfusion injury, splanchnic hypoperfusion, and delayed gastric motility. This condition is reportedly high in this patient population. § Studies investigating the incidence of stress-related gastritis and mucosal bleeding in critically ill dogs and cats are lacking. Moreover, as mentioned below, acid suppressant therapy may be associated with adverse effects. Thus, until such studies investigating the prevalence of gastric bleeding and gastritis in critically ill dogs and cats are performed, the author reserves acid suppressant therapy for critically ill dogs and cats with continuous vomiting or regurgitation and/or with suspected compromise of the gastric mucosal barrier (e.g., hematemesis, melena, clinicopathologic evidence for bacterial translocation). When acid suppression is warranted, co-administration of IV famotidine and pantoprazole does not appear to be more effective than pantoprazole alone even in the first few days of therapy. §

**Acid Suppressant Therapy May Not Be Benign**

Few side effects, with the exception of transient diarrhea and alteration of GI microbiota, have been described with short-term acid suppressant administration in dogs and cats. § § § Esomeprazole, omeprazole, and cimetidine are cytochrome P450 (CYP) inhibitors and thus can interfere with other drugs metabolized by CYP. However, no published studies have evaluated the effects of prolonged administration of therapeutic doses of acid suppressants in dogs and cats. Chronic acid suppressant therapy has been associated with adverse effects in humans including community acquired pneumonia and *Clostridium difficile*–associated diarrhea, bacterial/fungal overgrowth, thrombocytopenia, vitamin and electrolyte deficiencies, altered bone metabolism, and pathologic fractures. A study is under way in the author’s laboratory to evaluate the effects of prolonged omeprazole therapy in healthy cats. The results of this study will be shared at the time of this presentation. Currently, judicious use of acid suppressant therapy in dogs and cats along with careful monitoring when chronic acid suppression is warranted are recommended.

**References**