AUGUST 2019 • VOLUME 15 • ISSUE 3

Animal Health Perspectives

PDS's Changing Leadership and Unchanged Commitment to Diagnostic Excellence

By: Dr. Yanyun Huang (Interim Chief Executive Officer and Veterinary Pathologist, PDS)

The leadership of Prairie Diagnostic Services (PDS) Inc. is currently in a transition phase. Dr. Carl Johnson has resigned from the CEO position. We thank Dr. Johnson for his exceptional leadership over the last two years. Carl's rich experience in the animal health industry and product development permitted PDS to be more progressive in applied research and innovation. Carl's people-focused leadership style also won him a lot of hearts in the organisation. Carl will be greatly missed, and we wish him and his family much joy in the next phase of their life's journey.

I have been appointed as the interim CEO and am honored and humbled by the opportunity to serve in this position. I received my veterinary degree and first master's degree in China. I moved to Saskatoon in 2005 and finished a master and a PhD degree, specializing in anatomic pathology and swine health. I officially joined PDS in 2013 and worked as an anatomic pathologist and later, as the Director of Diagnostics. I recognize that yours truly has some big shoes to fill. I am thankful and overwhelmed by the support from the PDS Board of Directors, leadership team and all of the PDS staff, which only makes my job easier.

I would like to welcome Mr. Lionel Diederichs as our new Chief Financial Officer. Lionel's biography is included in this issue of Animal Health Perspective and you are encouraged to find out a little more about Lionel. Lionel will be a good addition to PDS's leadership team and will no doubt improve our financial management and more.

Change is one of the constants in life but PDS's commitment to diagnostic excellence will not change. Many new developments are underway in the organization, including the pursuit of new applied research projects, research collaborations, purchasing new state-of-the-art equipment and exploring new diagnostic methods in molecular biology, toxicology and clinical pathology, just to name a few. These activities (i.e. changes) are the efforts that PDS has invested in to keep our commitment to our clients unchanged. **Please stay tuned!**

WHAT'S INSIDE

A case of suspected chemodectoma in a dog

By: Lilani Munasinghe (Veterinary Pathologist, PDS)

An eleven-year-old, neutered male, Beagle dog was presented for a one week history of abdominal distention, coughing, straining to defecate and diarrhea. Eating and drinking habits and urination were unchanged. There were no changes in energy levels or behavior of the patient. Thoracic imaging (T-FAST) revealed a peritoneal effusion and a large, heterogeneous, moderately vascular mass measuring approximately 102.9 mm X 101.4 mm. The thoracic mass extended from the base of the heart to the cranial mediastinum. The mass appeared to be closely associated with the right and cranial aspect of the heart, causing leftward and caudal displacement of the heart. Although a large portion of the mass was located in the mediastinum, it was difficult to determine the origin of the mass (heart base vs. mediastinal). An echocardiographic examination was performed, however, this was of limited use due to the mass effect and distortion of normal anatomy. The right atrium was markedly dilated, with marked tricuspid regurgitation. Abdominal imaging (A-FAST) revealed hepatomegaly and ascites. Thoracoabdominal CT scan showed that there was a large, vascular mediastinal mass causing a significant mass effect to the adjacent structures with evidence of right-sided heart failure resulting in right atrial and caudal vena caval enlargement; hepatomegaly; ascites and a scant pleural effusion. Vascular invasion of the neoplasm into the cranial vena cava and left external jugular was also suspected. Sternal lymphadenopathy was also evident suggesting either a reactive process or metastatic disease. FNA sampling of the sternal lymph nodes was not performed. Pulmonary

Continues on Page 2

From Page 1

soft-tissue nodules were present raising the suspicion of possible tumor metastasis. There was a solitary nodule in the cranial pole of right adrenal gland which was not sampled for further evaluation. This patient has been previously diagnosed with pericardial effusion secondary to a right atrial mass 4 years ago. However, sampling of the mass or cytology of pericardial fluid was not performed at that time.

Abdominocentesis with follow up cytology indicated a modified transudate in the abdominal cavity which was likely secondary to congestive heart failure. Cytology was performed on fine needle aspiration (FNA) of the mediastinal mass (see Figure 1). The sample was moderate to markedly hemodilute and of moderate cellularity. Basophilic debris, magenta aggregates of ultrasound gel particles and a few poorly preserved cells as well as free nuclei were present in the background. The predominant cells were clusters of epithelial cells with distinct or indistinct cell borders, round nuclei, one or more prominent nucleoli and basophilic cytoplasm, sometimes with vacuolation. Anisocytosis and anisokaryosis appeared to be mild to moderate. A few acinar-like arrangements were also present. Mitotic figures were rare. Eosinophilic extracellular material was sometimes admixed with the neoplastic epithelial cells. Leukocytes were in proportionate to the level of hemodilution.

A chemodectoma and ectopic thyroid neoplasia were the main cytologic differential diagnoses while thymoma was considered as a less likely differential due to the lack of lymphocytic infiltration which is often observed with thymic neoplasia. Chemodectomas are uncommon tumors of dogs and most affected dogs are between 10 and 15 years of age. The majority of chemodectomas reported in animals are originated from aortic bodies while there are rare reports of carotid body tumors in dogs. Most of the aortic body tumors in dogs are benign adenomas and are slow growing tumors. Carotid body tumors are more likely to be malignant and may metastasize to mediastinum, liver, lung, brain and heart mostly during later stages of the disease. Chemodectomas need to be differentiated from ectopic thyroid tumors. The presence of cytoplasmic blue-black, tyrosine granules and presence of pink colloid may be helpful for identification of thyroid neoplasia. Convincing tyrosine granules were not evident in these neoplastic cells.

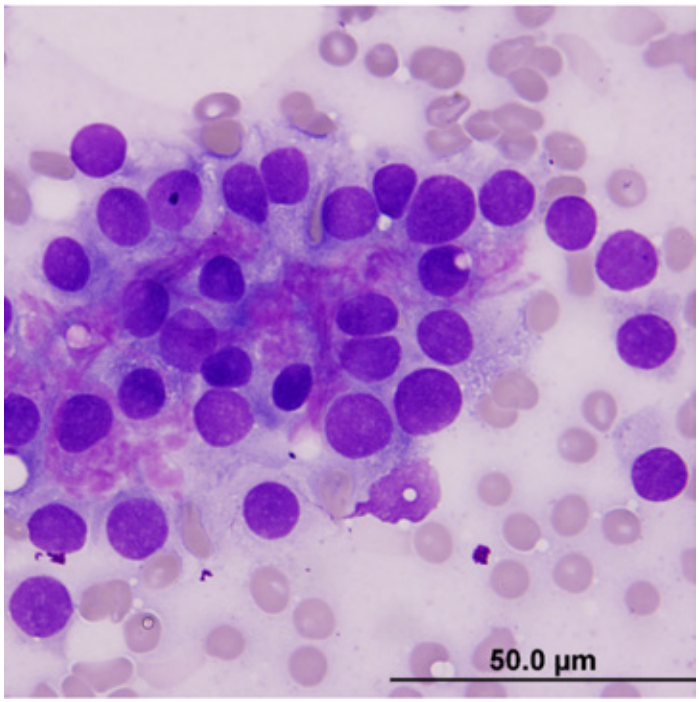

Figure 1. **Neoplastic cells admixed with eosinophilic extracellular material. Modified Wright-Giemsa, ×100 objective**

Although pink extracellular material was present in this case, there are rare reports of small to abundant amounts of pink extracellular material in chemodectomas making differentiation of ectopic thyroid tumor and chemodectoma difficult without histopathology and immunohistochemical stains. Histopathology was not performed in this case. After 2 weeks of presentation, the patient was humanely euthanized due to worsening clinical symptoms. However, a necropsy was not performed at owner's request.

References:

Raskin RE and Meyer DJ. Canine and Feline Cytology (Third Edition), W.B. Saunders, 2016, pages 430-452.

Barger AM and Macneil AL. Small Animal Cytologic Diagnosis. Boca Raton, FL: CRC Press, 2017, pages 457- 470.

Testing for Equine Pituitary Pars Intermedia Dysfunction (aka: Equine Cushing's)

(Excerpted from the 2017 PDS Protocol Manual)

A pituitary pars intermedia dysfunction (PPID) working group (Equine Endocrinology Group, EEG) has established recommendations for the diagnosis and treatment of PPID and these are regularly updated on their website (http://sites.tufts.edu/equineendogroup).

The following laboratory tests may aid in confirming a diagnosis of PPID in horses and ponies suspected of having the disease: dexamethasone suppression test (measuring cortisol); baseline endogenous ACTH concentration; thyrotropin releasing hormone (TRH) stimulation test (measuring ACTH). Occasionally, more than one test may be required to diagnose PPID.

DEXAMETHASONE SUPPRESSION TEST (DST)

The DST is increasingly being replaced by other tests described below for the diagnosis of PPID. Clinicians may choose to avoid the DST in a patient with a predisposition to laminitis. Also, the alternative tests below may allow for detection at an earlier stage of development of the disease so that, with appropriate treatment, many effects of PPID may be averted.

ENDOGENOUS ACTH CONCENTRATION

Endogenous ACTH concentration can be used to diagnose PPID and it can also be used to monitor response to therapy for PPID. Baseline ACTH concentrations are variable and seasonal (higher in the fall than in winter through to summer).

TRH STIMULATION TEST

Horses with PPID have a marked increase in plasma ACTH concentration in response to TRH (interpret results relative to the RI provided by the reference laboratory performing the test). Equine PPID and Insulin Dysregulation PPID may be accompanied by insulin dysregulation (ID) which is also a component of equine metabolic syndrome (EMS). Conversely, horses with EMS may be predisposed to PPID. Horses with ID are particularly susceptible to laminitis. It is recommended that horses >10 yr with EMS be monitored for PPID. ID refers to increased insulin response to oral sugars or consumed feeds, fasting hyperinsulinemia, and tissue insulin resistance. The tests used for the diagnosis and monitoring of ID are: fasting insulin concentration, the oral sugar/glucose test (measuring postprandial insulin and glucose), and the insulin tolerance test (measuring glucose). See the EEG website for test protocols and expected results (http://sites.tufts.edu/equineendogroup).

[The 2017 PDS Protocol Manual can be found on the PDS website: <pdsinc.ca>. Resources → Sample Protocols → Submission → Clinical Pathology Testing and Sample submission Protocol [pdf can be downloaded]. See page 25 for 'Equine PPID and Insulin Dysregulation' testing protocols.]

Frequency of *Escherichia coli* virotypes in calf diarrhea and intestinal morphologic changes associated with these virotypes or other diarrheagenic pathogens

By: Musangu Ngeleka and Dale Godson (Veterinary Microbiologists, PDS)

Diarrhea in calves is a common clinical sign associated with pre-weaning morbidity and mortality in cattle operations worldwide. Multiple factors associated with this diarrhea include pathogens such as *Escherichia coli*, *Clostridium perfringens*, *Salmonella enterica* ssp. *enterica*, rotavirus (RV), bovine coronavirus (BCoV; species Betacorona virus 1), *Cryptosporidium* spp., and *Eimeria* spp. Failure of passive colostral transfer to the calf and myriad environmental factors may have a role in development of calf diarrhea.

The role of *E. coli* has been recognized for many years and it is still commonly accepted as an important cause of diarrhea in calves. Multiple *E.coli* pathotypes have been associated with diarrhea in domestic animals; however, enterotoxigenic *E. coli* (ETEC) producing heat stable enterotoxin A (STa) and expressing F5 (K99) fimbriae, i.e. virotype STa:F5, is considered the major cause of diarrhea in calves that occurs during the first week of life. The role of other *E. coli* virotypes in production of the disease has not been demonstrated clearly.

We investigated the frequency of *E. coli* virotypes and their potential role in calf diarrhea by assessing (i) the frequency of genes encoding virulence factors (virulence gene profiles or virotypes) in *E. coli* cultures from intestinal contents and (ii) the intestinal morphologic changes associated with these virotypes or other bovine diarrheagenic pathogens in newborn to 8 week-old calves with (n=105) or without diarrhea (n=100). All samples were cultured for *E. coli*, *Clostridium perfringens* and *Salmonella* spp; tested by PCR for the major bovine enteric viruses (RV and BCoV) and routine fecal flotation for the detection of *Cryptosporidium* spp. and *Eimeria* spp., using standard laboratory techniques. *E. coli* virotyping was done by colony hybridisation or PCR for virulence genes that define the *E. coli* pathotypes commonly found in calves ETEC (estA and f5), enteropathogenic *E. coli* (eae), shiga toxin-producing *E. coli* (stx1 and stx2) and additional virulence genes astA, cdtB-1, cnf1/2, iucD, iroN, f17, papC, tsh, sfaA, afaD8 and paa associated with *E. coli* from cases of diarrhea and septicemia, or both.

A variety of *E. coli* virotypes were detected without discrimination in isolates from both groups of calves. The main virotypes included: EAST1:F17; EAST1:CDT:CNF:F17; EAST1:EAE, this last associated or not with CDT, CNF, Stx1, Stx2 and F17. Interestingly, virotype STa:F5, associated or not with EAST1 or F17, was detected only from calves with diarrhea. In a preliminary study, this virotype was also detected only from feces of calves with diarrhea, suggesting that virotype STa:F5 remains the most significant cause of *E. coli* diarrhea in calves.

On histologic examination, most morphologic changes were observed in the ileum or colon of calves with diarrhea. Bacterial attachment to enterocytes, characteristic of ETEC, was only observed in calves from which virotype STa:F5 was detected. For the remaining samples, no *E. coli*-like bacteria were seen attached or in close proximity to the intestinal epithelial cells. In the group of calves without

Continues on Page 4

From Page 3

diarrhea, no significant intestinal morphologic changes were observed, despite isolation of *E. coli* and detection of associated virotypes from all of the calves. In contrast, the intestinal lesions observed, in the majority of calves with diarrhea, were attributed to diarrheagenic pathogens other than *E. coli*. These lesions included necrotizing enteritis with or without hemorrhage associated with C. *perfringens* type A and E in 1 to 15 day-old calves (12.4%), and fibrinonecrotic enteritis or colitis associated with *Salmonella* ser. *Typhimurium* and *Salmonella* ser. *Infantis* in 3 to 14 day-old calves (7%). Additional intestinal lesions observed included atrophic enteritis with or without crypt necrosis, associated with RV in 6 to 21 day-old and BCoV in 1 to 14 day-old calves (41.9%). Protozoan ileitis was associated with *Cryptosporidium* spp. in 5 to 21 day-old (19.0%) and hemorrhagic typhlocolitis associated with *Eimeria* spp. in calves over 49 days old (1.9%). As mentioned above, no significant intestinal morphological changes were observed in the intestines from calves without diarrhea, despite isolation of *E. coli*, from all of the samples, C. *perfringens* type A from 60% of samples, and detection of RV and BCoV in 40% of samples. These agents have high likelihood of being endemic in bovine populations; therefore, the detection of one or more of these agents with current tests may not be sufficient criteria to ascribe disease status. In contrast, *Salmonella enterica* ssp. *enterica*, *Cryptosporidium* and *Eimeria* spp. were not isolated or detected in calves without diarrhea, suggesting that the presence of these pathogens as well as *E. coli* virotype STa:F5 may be considered for final diagnosis of diarrhea in young calves.

Overall, our results show that *E. coli*, other than STa:F5, does not seem to play a significant role in diarrhea of calves. Testing or detection of STa:F5 virotype may be sufficient for routine diagnosis to rule out neonatal colibacillosis in calves less than 7 days of age. For other diarrheagenic pathogens such as C. *perfringens*, RV and BCoV simple detection of these organisms from calves with diarrhea may not be sufficient to ascribe disease status, but should be confirmed by histopathology.

[This article is part of a complete manuscript that has been accepted for publication in an upcoming issue of the Journal of Veterinary Diagnostic Investigation.]

Staff Updates:

Introducing Lionel Diederichs

(CFO, Prairie Diagnostic Services, Inc.)

Lionel grew up in rural Saskatchewan with a mixed farm and small-town background. His career took him to senior leadership roles in small and large public sector organizations in many locations around the province. With a deep interest in leadership, governance, people development and organization design, he developed several leading strategic and operational innovations that improved organization sustainability, operations and service to citizens. Lionel holds an MBA and is a Professional accountant. He was honored with a Fellow of the Profession in 2010 and has been elected as president of two provincial professional organizations and served as a provincial representative to National organizations. Lionel also has a background in small businesses and supporting decent, affordable housing projects.

Being back in Saskatoon, Lionel enjoys connecting with family and friends. He is an avid motorcyclist and enjoys motorcycle racing with his son.

Farewell to Carl Johnson

(former CEO, Prairie Diagnostic Services, Inc.)

Dr. Carl resigned as CEO of PDS in late 2018 and has been working as a consultant for PDS to ease the transition to an interim or CEO. Carl received his Doctorate of Veterinary Medicine from the NYS College of Veterinary Medicine at Cornell University and then headed directly into mixed animal practice in Vermont and then in upstate New York. After five years or so of mostly dairy cattle and companion animal practice, he chose to pursue an interest in pharmaceutical research and development. He joined Pfizer Animal Health in the late 1980's, which led to a series of R&D roles of increasing leadership responsibility with several multinational animal and human health companies. Carl became CEO of PDS in September 2016. Carl brought a people-focused leadership style to PDS that encouraged everyone to strive to do their best and contribute to ongoing improvements in the workplace. His door was always open to staff for a quick chat or a deeper conversation about any issues that were of concern. We wish Carl and his family the best that life has to offer as they start another chapter in their lives.

Farväl, Carl !

READERS' FEEDBACK

The **Animal Health Perspectives** editorial team (Dr. Moira Kerr, Brian Zwaan and Kathryn Tonita) invite readers' comment on material published in the newsletter or questions on material submitted by contributors.

Submit your comments or concerns to Dr. Moira Kerr (email: moira.kerr@pds.usask.ca) and they will be forwarded appropriately.