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Awanui Veterinary

Pathology in focus

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Canine gastric neoplasia

Cathy Harvey

Clinical history

A six year-old Irish Setter presented at his veterinarian for worsening lethargy, tachypnoea and anorexia. He had been treated with multiple antibiotics over the past several months for a swollen left elbow and lameness. Two days prior to presentation he started drooling excessively, along with heavy breathing.

Previous blood work showed a low haematocrit, moderate neutrophilia, severely elevated CRP (>100) and mild hypoalbuminemia.

The dog was euthanised and submitted to the laboratory for necropsy.

Post mortem findings

The stomach contained an ulcerated transmural white-tan semisoft mass (figure 1). The adjacent gastric/splenic lymph nodes were markedly enlarged, were diffusely semisoft, red-tan-white with a 15 mm firm brown area. The sternal lymph node was markedly enlarged, soft and diffusely tan-red.

Mild pulmonary oedema was evident in the lungs.

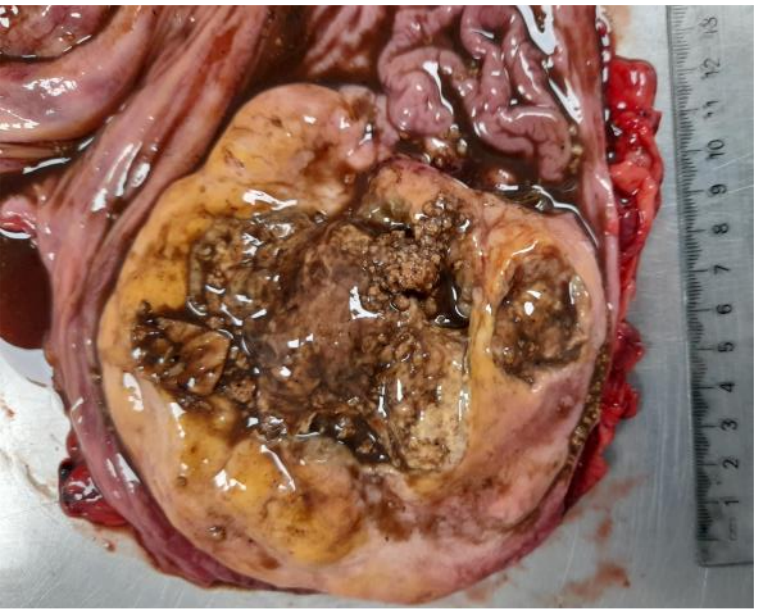

Figure 1. Necropsy: stomach mass.

Histology findings

Stomach mass, sternal lymph node, gastric / splenic lymph node and spleen displayed sheets of neoplastic large lymphocytes with numerous mitotic figures (figure 2). The neoplastic lymphocytes had a small to moderate amount of cytoplasm and moderate anisokaryosis of the round to clefted nuclei. The neoplastic cells were transmural in the stomach and extended into the adjacent adipose tissue surrounding the lymph nodes. The stomach was ulcerated, and the lymph nodes contained areas of necrosis.

The lungs contained numerous neutrophils and small numbers of mixed bacteria.

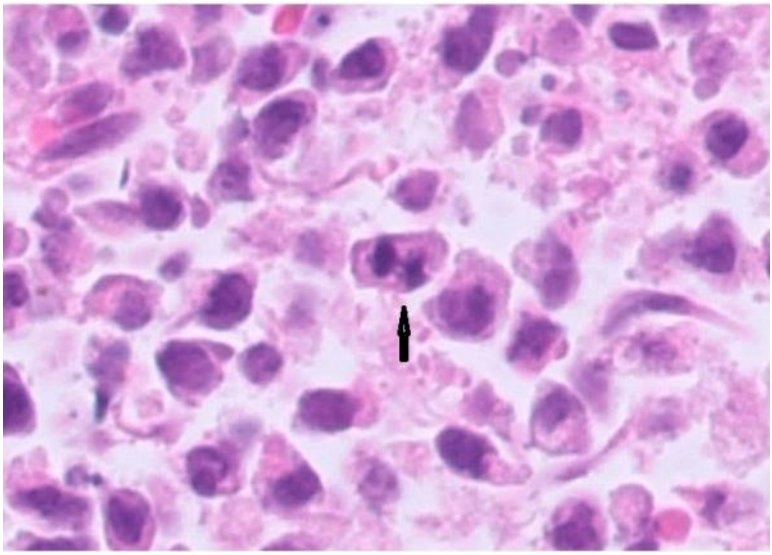

Figure 2. Histopathology, H&E stain - sheets of round cells with mitotic figures.

Diagnosis

Transmural gastric large cell lymphoma with ulceration, and metastases in gastric/splenic and sternal lymph nodes with necrosis. Severe neutrophilic bronchopneumonia was also present.

Discussion

Gastric neoplasia is reported to be rare in dogs. In surveys of canine neoplasms, only 0.06% to 0.2% were gastric neoplasms. Around 75% of canine gastric neoplasms are malignant, with adenocarcinomas comprising 60% of all neoplasms. Leiomyomas and leiomyosarcomas have been reported to represent 19% and 8% of canine gastric neoplasms, respectively. Lymphoma is the only other type of neoplasm commonly reported in the canine stomach, representing around 9% of neoplasms. The most common clinical signs of gastric neoplasia in dogs are vomiting, anorexia, and weight loss. Less commonly hematemesis, anaemia, melena, diarrhoea, polydipsia, and abdominal pain are observed.

Initial investigation of suspected gastric neoplasia in dogs is often by contrast radiography or ultrasonography. Ultrasonography has been reported to have a sensitivity of 81% and a specificity of 71% in detecting canine gastric neoplasia and is also useful to guide fine needle aspirates or punch biopsies. Endoscopy can identify some epithelial neoplasms; however, diffuse adenocarcinomas form sessile intramural masses and can be difficult to detect endoscopically. Multiple deep endoscopic biopsies should be taken of ulcerated neoplasms to maximize the

chances of obtaining a diagnostic sample. An invasive behaviour of the cells is an important indicator of neoplasia. This can be difficult to assess from an endoscopic biopsy and it may not be possible to make a definitive diagnosis, especially in well differentiated neoplasms.

Cytology may allow a definitive diagnosis of a gastric malignancy. Specimens for cytology can be obtained by endoscopic brush samples, ultrasound guided fine-needle aspirates, or abdominocentesis. As with other ulcerated neoplasms, surface inflammation may prevent diagnosis from an endoscopic brush sample. Furthermore, as diffuse adenocarcinomas are predominantly present in the submucosa, endoscopic brushings may not collect neoplastic cells. Ultrasound guided fine-needle aspirates of gastric neoplasms are useful, although a study of 14 canine and feline gastric neoplasms revealed complete agreement between cytological and histological diagnosis in only half of cases. Cytological differentiation between an adenoma and a hyperplastic polyp and differentiation between a small cell lymphoma and lymphocytic gastritis is not possible. Although abdominal carcinomatosis has been reported in both dogs and cats with gastric neoplasia, abdominocentesis is less commonly used as a diagnostic test in these species.

Gastric lymphoma in dogs usually develops as a component of more extensive intestinal disease. As the mammalian gastrointestinal tract has one of the largest populations of lymphoid cells in the body, it is unsurprising that the gastrointestinal tract is the most common location of extranodal lymphomas in most domestic species. Although a gastrointestinal lymphoma is initially confined to the gastrointestinal tract, it may spread to mesenteric lymph nodes or other tissues as the disease progresses.

Grossly, intestinal lymphoma may be diffuse or localized; when localized, the lesion can bulge intraluminally or be intramural. Neoplasia may be restricted to one site in the intestinal tract, diffusely infiltrate the small or large intestine, or multiple tumours may occur at various levels. Intestinal lymphomas can be plaque-like, nodular, diffuse, or fusiform (circumferential) in shape. Fusiform intramural or transmural lesions frequently balloon outward because the invaded muscle atrophies, leaving proliferations of neoplastic lymphoid cells supported only by parallel bands of delicate reticulum fibres. Advanced, diffuse lesions present as thickened rigid mucosal folds in the stomach, and in intestinal cases the mucosal surface has a granular or cobblestone appearance.

Gastrointestinal lymphoma is much less common than the multicentric form in dogs. However, the gastrointestinal tract is the most common extranodal location for lymphoma in dogs and accounts for 5–7% of all canine lymphomas. Primary gastrointestinal lymphoma affects a wide variety of breeds and has a higher prevalence in male dogs. The disease can develop at any age, but old to middle-aged dogs are most commonly affected (median age around 8 years).

No aetiology has been established. The most common clinical signs include vomiting, diarrhoea, melena, weight loss, anorexia, and lethargy. Non-regenerative anaemia, neutrophilia, and hypoalbuminemia are common in dogs with gastrointestinal lymphoma. Gastrointestinal lymphomas in dogs occur most commonly in the small intestine, followed by the stomach and the large intestine. In recent studies T-cell lymphomas are more common than B cell lymphoma. Multifocal tumours, which are less common than single tumours, may involve various combinations of different sites, for example, stomach and small intestine. The prognosis is poor and dogs rarely survive longer than 6 months after diagnosis. There are no outcome data based on prospective studies.

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References

Tumors in Domestic Animals Fifth Edition. Edited by Donald J. Meuten. 2017 John Wiley & Sons, Inc.

Kojima et al. Histopathological features and immunophenotyping of canine transmural gastrointestinal lymphoma using full-thickness biopsy samples. *Vet Path.* 58:1033-1043, 2021.

Pathologist spotlight

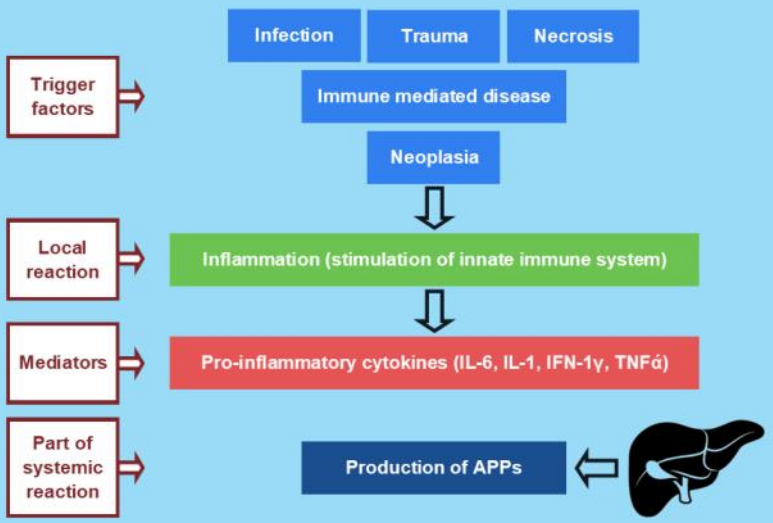
Cathy Harvey obtained her BVSc. from Massey University, completed a pathology residency at the University of Pennsylvania, is a Diplomate of the ACVP (anatomic pathology) and a Registered Specialist in Veterinary Anatomic Pathology. She has worked in veterinary practice in New Zealand, as a pathology fellow at the San Diego Zoo, as well in diagnostic laboratories for many years.

Cathy has extensive experience in histopathology, post mortems, cytology and a special interest in wildlife pathology.

C-reactive protein - is it useful?

Sandy Weltan

An acute phase protein response is part of the innate host defence system and is a non-specific response to tissue injury.



Acute-phase proteins (APP) are glycoproteins which are mostly produced in the liver. C-reactive protein (CRP) is a major APP in dogs, meaning that it is present in low concentrations, increases 100 to 1000 fold with inflammation, peaks in 24-48 hours and decreases rapidly. CRP is a sensitive but non-specific marker of inflammation. Serum amyloid A (SAA) is the major APP in cats.

There was a large amount of interest in CRP in the early and mid-2000s when a commercial kit for measuring canine CRP became available, with investigators measuring CRP concentrations in a number of different disease conditions. Diseases in which marked increases in CRP do occur are:

- Infections (viral, bacterial, rickettsial, protozoal)
- Endotoxaemia
- Neoplasia associated with necrosis
- Acute pancreatitis
- Immune mediated haemolytic anaemia
- Immune mediated thrombocytopaenia
- Immune mediated polyarthritis
- Steroid responsive meningitis-arteritis.

Because minor increases occur in numerous disease conditions and there is overlap between normal concentrations and those in disease, a suggested clinical decision limit is 20 mg/L (the reference interval we use) and a pathological decision limit of 65 mg/L.

The greatest use of CRP is in detecting inflammation when the white cell count (WCC) is not elevated and in monitoring response to treatment.

It is a useful and non-invasive method for distinguishing steroid responsive meningitis arteritis from other CNS diseases. The only other neurological condition in which CRP is increased is in septic meningitis which is extremely uncommon in dogs.

It is very useful in monitoring response to treatment in:

> Parvoviral infection

> Sepsis

> Immune mediated haemolytic anaemia

> Immune mediated polyarthritis

> Steroid responsive meningitis-arteritis.

If CRP levels are measured at the time of diagnosis, a steady decline in concentration indicates a response to treatment and a good prognosis. If levels fail to decrease or start to increase again, that indicates a lack of response to treatment and a guarded outcome. In immune mediated conditions that are treated with corticosteroids, the WCC may not decline because of the stress leukogram associated with the corticosteroids.

What's your diagnosis?

A monthly spot quiz

Test your skills with this gross photo:

A 15-month-old dairy heifer presented for examination of a growth protruding from the nasal cavity.

What's your diagnosis? *(Answer on last page).*

Lactating cows and trace elements

Magnesium and copper requirements of cows increase dramatically in late pregnancy and early lactation, and selenium concentrations are at their lowest in spring. Trace element testing will help ensure the physiological concentrations of these elements are at the appropriate levels (see Table 1).

Table 1. Appropriate levels of dietary magnesium and copper

	Maintenance	Late pregnancy	25L milk / day
Magnesium (g/day)	8	10	26
Copper (mg/day)	65	100	115

Measuring serum copper at this stage of the year determines if the pre-winter strategies for supplementation have maintained serum concentrations through to spring.

For accurate assessment of liver reserves, copper analysis of a liver biopsy is the preferred sample.

Regular serum magnesium assessment is recommended throughout lactation to monitor the efficacy of supplementation programs. Testing in the transition period establishes the baseline values of the herd.

Selenium is a critical element for health and reproduction. Ensuring selenium concentrations are optimal in the transition period allows time for any required supplementation to be planned and implemented.

The panels in Table 2 can be used as a guide, but can be adapted to suit your requirements. Please indicate clearly on the submission form how many of each test you would like performed.

Table 2. Recommended samples for lactating cows trace element testing

	No. of samples	Sample type	Blood tube
Magnesium	10	Serum	Plain (red top)
Copper* or	10	Serum	Plain (red top)
Ferroxidase	10	Serum	Plain (red top)
Selenium or	5	Serum	Plain (red top)
GPx	5	Whole blood	EDTA

**Plasma copper is an alternative test – collect sample in a heparin blood tube.*

Some commonly requested additional tests include:

NEFA and BOH

NEFA (non-esterified fatty acids) and BOH (beta hydroxy butyrate) are used to assess the energy balance and adequacy of intake in grazing ruminants. NEFA's are best assessed from 15 days before, to 30 days after, parturition. Elevations above reference values indicate insufficient energy intake. BOH can be measured at any time to assess whether intake is sufficient. Elevations indicate when triglycerides are being mobilised as a source of energy in the absence of sufficient dietary glucose precursors (propionate, lactate and amino acids) or the diet contains high concentrations of butyric acid. High concentrations of BOH in serum indicate animals are in a negative energy balance and are hypoglycaemic.

GGT

The liver is the main source of GGT in serum. In the presence of sporidesmin, bile ducts are damaged and occluded resulting in marked increases in GGT concentrations. Serum GGT activities increase up to 10 times above the upper reference range by 7-10 days after sporidesmin intake. Serum activity after sporidesmin exposure steadily declines from 4-6 weeks after the danger period has passed. However, a proportion of cattle may still have abnormal activity of GGT up to seven months later.

Zinc

There are no significant stores of zinc in the body. Most of the control of zinc is through regulation of the amount of zinc absorbed from the diet. Serum is the preferred test for determining the zinc status of animals.

Iodine or Thyroxine (T4)

Throughout New Zealand iodine deficiencies can be induced by feeding brassica crops like kale or grazing soil low in iodine. However, their effect can be nullified by supplementing with extra iodine. Serum samples for inorganic iodine should be collected from 5 to 10 individuals pre-calving (if the cattle have been on brassica crops) or pre-mating and the peak of lactation. An indirect measurement of iodine status via T4 is also available.

Vitamin B12

Although verified data is lacking, there have been numerous suggestions cattle respond to vitamin B12 supplementation on some farms. Concentrations are falsely increased in animals with liver disease (e.g. facial eczema).

Additional information can also be found in our MineralCheck package information online.

Sample location on slides

Kathryn Jenkins

Our laboratory automated stainers use an alcohol-based stain, which provides enhanced stain quality and consistency when staining large numbers of cytology smears and blood films. Compared to quick (aqueous based) stains, alcohol-based stains (such as modified Wrights) allow improved characterisation of nuclear detail, and increased detection of mast cells (especially poorly differentiated cells), granular lymphocytes, grey eosinophils, and less common diseases including lysosomal storage disease.

Importantly, the automated stainers have a specific range of staining (central 2/3 of the glass slide). This means that samples outside this area will remain unstained. Cases can then be re-stained with a quick stain to capture the ends, however these areas are then subject to the limitations as mentioned above. Additionally, material at the edges of the slides can be very difficult to examine at higher power due to the physical limitations of the microscope stage.

Help us to help you, by ensuring blood films and cytology samples are located within the central 2/3 of the glass slide (see figure 1). Slide A shows a sample at the end of the glass slide, which needed to be re-stained using a quick stain. Slide B shows a sample in an ideal central location. The stain demarcation line can be clearly seen (arrow).

In brief

- We often get asked where you can find what tests are in the panels and profiles on our submission forms. The good news is, they're all on the reverse side of the form! Plus they're also in our price book.

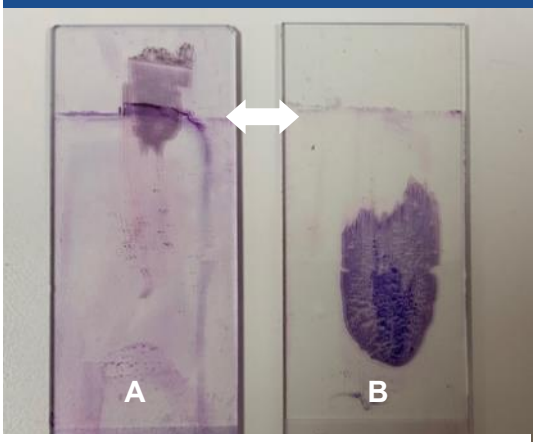


Figure 1 (right). Slide A—the sample is placed too close to the edge of the slide and most of the material is not able to be stained by the automatic stainer. Manual re-staining was required. Note the line (arrow) where the automated stainer does not reach. Slide B—sample is in centre of slide and has been completely stained.

From page 4: What's your diagnosis? Actinobacillosis ('woody nose'). *Actinobacillus lignieresii* classically causes woody tongue, but may also be associated with pyogranulomatous lesions in the lips, nares and regional lymph nodes. In fact, we are more likely to diagnose 'woody nose', 'woody chin' or 'woody lymph node' through the diagnostic laboratory, as woody tongue lesions are well recognised by practitioners and therefore rarely biopsied. Less common manifestations of actinobacillosis include cutaneous lesions and chronic bloat due to oesophageal groove infection. 'Sulphur' granules may be seen grossly in some cases and correspond to bacterial colonies surrounded by immune complexes seen histologically. The 'woody' part of the disease relates to the dense fibrous reaction that accompanies the inflammation, imparting a firm texture to the tissue. The diagnosis is readily confirmed by biopsy or through demonstrating the bacteria in purulent discharge.

Contact us

- contacting Awanui Veterinary couldn't be easier.

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