**Diagnosis of Campylobacter Diarrhea in Companion Animals**

By: Lori Moon, BS, MT (ASCP) and Carole Bolin, DVM, PhD

Campylobacteria are small, curved or spiral Gram-negative rods that require a reduced oxygen concentration for growth. Campylobacter spp. are capable of causing diarrhea in humans, dogs, cats, calves, sheep, lab and zoo animals, horses, and other animals. Campylobacter species *jejuni* and *coli* are the most frequent causes of human campylobacteriosis;² *C. upsaliensis* and *C. jejuni* are more common in dogs. Campylobacteriosis is the most frequent cause of bacterial diarrhea in humans² and can be isolated from clinical as well as asymptomatic companion animals. Most cases of campylobacteriosis in humans are acquired by ingestion of contaminated food or water, but approximately 6% of human cases are associated with contact with infected companion animals.²

Clinical campylobacteriosis is most frequent in puppies and kittens less than 6 months of age and presents as mucoid and/or watery diarrhea (often blood tinged) and inappetence that lasts for approximately one week. Intermittent diarrhea may persist for several weeks in some animals. In older dogs and cats, asymptomatic infection and shedding is common. Fecal-oral transmission is typical and clinical signs often appear 2 to 5 days after exposure. Infection is particularly common in dogs that are co-housed, such as puppies housed together at kennels or animal shelters. After ingestion, the organism multiplies in the distal small intestine and a bacterial toxin is responsible for intestinal damage and the resulting diarrhea. The organism can survive for approximately 1 month in environmental feces.

Occasionally in young, stressed, or immunocompromised animals and humans, Campylobacter gains access to the bloodstream and can cause serious, life-threatening infections. Over a 3-week period during the summer of 2009, DCPAH isolated Campylobacter *jejuni* from blood cultures from 3 dogs from different regions of Michigan, and the problem is likely more widespread.

Overall, the prevalence of campylobacteriosis in companion animals is increasing and is likely the result of improved methods of detection. In two studies from Ireland, the overall prevalence of infection in household cats and dogs was found to be greater than 40%,³ while the overall prevalence of Campylobacter in shelters ranged from 51.1% to 87%.³ The isolation of chronic diarrhea in adult companion animals (Product Order #99603).

We will now be providing the Cary and Blair medium for the transport of fecal samples for Campylobacter culture.

![FIGURE 1: Scanning electron micrograph of Campylobacter showing characteristic shape and polar flagella. Photo courtesy of USDA, Agriculture Research Service.](image1)

![FIGURE 2: Vial containing Cary and Blair medium for the transport of fecal samples for Campylobacter culture.](image2)

Many different kinds of infections can cause diarrhea and bloody diarrhea. Campylobacter infection is diagnosed when culture of a stool specimen yields the organism. This common cause of diarrhea will be missed, however, if you do not specifically look for it. The most successful recovery in culture requires special transport media (Cary and Blair medium), special culture media, and that the culture be set up immediately upon arrival in the laboratory.⁶ Most veterinary practices do not stock the preferred enriched Cary and Blair medium that is ideal for transport and recovery of Campylobacter.

2 www.cdc.gov/node.do/id/0900f3ec80006b8f
3 Vet Rec. 2009 Jan 10; 164(2):44-7
New Antimicrobial Susceptibility Test (AST) MIC panels

As of October 14, 2009, you will notice a slight change in our AST reporting. The Companion/Equine MIC Panel from Trek Diagnostics, Inc. has been discontinued and is being replaced with separate panels for equine and companion animals.

Changes to the Companion Animal MIC Panel include the addition of ceftiofur, doxycycline, and extra MIC dilutions for cefazolin and clindamycin. Cephalothin, orbifloxacin, spectinomycin, and tetracycline have been removed from the panel.

The new Equine MIC Panel has the addition of azithromycin, cefadroxil, clarithromycin, doxycycline (in addition to tetracycline), and extra MIC dilutions for amikacin, amoxicillin, erythromycin, and rifampin. Augmentin, erythromycin, and rifampin are not included.

Since cephalothin is no longer included on either panel, cefazolin will represent the 1st generation cephalosporins on both types of panels. Please see our website for drug-specific MIC changes, MIC breakpoints, and the use of MICS in guiding therapy.

New Diagnostic and Prognostic Panels for Canine Melanomas

By: Rebecca Smedley, DVM, MS, Dipl ACVP; Matti Kiupel, DVM, PhD, Dipl ACVP

Clonality assays can help to distinguish reactive from neoplastic lymphoid cells. Lymphoid neoplasms are monoclonal expansions of malignant lymphoid cells, whereas lymphoid cells in an inflammatory reaction are usually polyclonal. The tests are based on a single uniplex or multiplex PCR for T cells and a double uniplex or multiplex PCR for B cells, targeting the CDR3 region of T-cell receptor gamma and immunoglobulin heavy chain genes, respectively. PCR primers are targeting conserved regions flanking the hypervariable regions of these genes. When used for canine or feline lymphoid diseases, the tests are often referred to as PCR for Antigen Receptor Rearrangements (PARR). There are numerous indications for using PARR in canine or feline lymphoid diseases, especially when the morphological, cytological, or immunophenotypic properties of a lymphoid cell population are inconclusive. For example, PARR is useful to differentiate follicular lymphomas such as T-zone lymphoma or marginal zone lymphoma from hyperplastic reactions when there is lack of architectural effacement. PARR can also be used to characterize lymphohistiocytic proliferations in the feline or canine skin and is a major component of the diagnostic algorithm to differentiate feline inflammatory bowel disease from intestinal lymphoma (refer to “Feline Intestinal Lymphoma Panel” under Diagnostic Sections - Immunohistochemistry on our webpage for additional information). MSU DCPAH is now offering PARR for canine and feline tissues. PARR results should never be interpreted independent of morphology. We therefore only offer PARR in combination with a biopsy or a second opinion and immunophenotyping. For feline intestinal biopsies, a specific panel is available (see above). For all other PARR testing, the cost is $100 for the T-cell PCR and $150 for the 2 B-cell PCRs. We perform all reactions in duplicate. The PCR products are run directly on gels in their native form, as well as after denaturation and reannealing.

FIGURE 1: Amelanotic melanoma: weak labeling with Melan-A (left), but strong labeling with the cocktail (right).

Melanoma Prognosis

Accurately determining the prognosis for canine malignant melanomas, especially those of the oral cavity, is difficult. Recent evidence suggests that a subset of canine oral melanomas may have a more favorable prognosis than historically thought. Nuclear atypia is a predictive histological feature; however, it is subject to interobserver variation and difficult to assess in some melanomas. The nuclear protein Ki67 (MIB-1) is expressed in all proliferating cells and can be used for the prediction of prognosis of melanomas by IHC. In a large multi-institutional study, we determined that Ki67 is a valuable marker to differentiate canine oral melanomas with a favorable prognosis from those with more malignant behavior. The mean Ki67 values for dogs that survived 1 year were significantly lower than those for dogs that were dead at 1 year.

MSU DCPAH is now offering the combined diagnostic and prognostic panel for melanomas for $100. This panel includes staining with the described immunodiagnostic cocktail and Ki67 for prognostic information. Ordered individually, the diagnostic melanoma panel alone costs $65 and the prognostic melanoma panel alone costs $40. These panels aid in the accurate diagnosis and prognostication of canine oral melanomas in a cost-effective and efficient manner.
## Bovine Disease Panels Now Available!

By: Steve Bolin, DVM, PhD ; Roger Maes, DVM, PhD; Carole Bolin, DVM, PhD; Tom Herdt, DVM, DACV

### Bovine Disease Panels

#### Neonatal Calf Respiratory Disease Panel (95500) $102
- **Respiratory Culture & Susceptibility**
- **Mycoplasma** Culture
- Bovine herpesvirus-1 PCR
- Bovine Respiratory Syncytial virus PCR
- Lung or Tracheal Wash and Viral Nasal Swab

#### Bovine Respiratory Screen - (80123) $66
- Bovine Rotavirus ELISA
- Bovine Coronavirus PCR
- Feces or Viral Fecal Swab

#### Neonatal Calf Enteric Disease - Core Panel (95501) $70
- Cryptosporidiosis
- Fecal/Intestinal Culture & Susceptibility
- *Clostridium perfringens* Culture**
- Feces and Anaerobic Fecal Swab (Anaerobic Transport such as Starplex™ Starswab Anaerobic Transport System or BBL Port-A-Cult™)

#### Neonatal Calf Enteric Disease - Full Panel (95502) $123
- Bovine Respiratory Screen: Rotavirus ELISA, Bovine Coronavirus PCR
- Cryptosporidiosis
- Fecal/Intestinal Culture & Susceptibility
- *Clostridium perfringens* Culture
- Feces and Anaerobic Fecal Swab (Anaerobic Transport such as Starplex™ Starswab Anaerobic Transport System or BBL Port-A-Cult™)

#### Calf Respiratory Disease Panel (95503) $140
- Bovine Respiratory Screen PCR: includes BVDV, BHV-1 (IBR virus), PI-3 virus, & BRSV
- Respiratory Culture & Susceptibility
- Mycoplasma Culture
- Lung or Tracheal Wash and Viral Nasal Swab

#### Calf Enteric Disease Panel (95504) $80
- Cryptosporidiosis
- Qualitative Fecal
- Fecal/Intestinal Culture & Susceptibility
- *Clostridium perfringens* Culture
- Feces and Anaerobic Fecal Swab (Anaerobic Transport such as Starplex™ Starswab Anaerobic Transport System or BBL Port-A-Cult™)

#### Adult Bovine Respiratory Disease Panel (95505) $133
- Bovine Respiratory Screen PCR: includes BVDV, BHV-1 (IBR virus), PI-3 virus, & BRSV
- Respiratory Culture & Susceptibility
- Lung or Tracheal Wash and Viral Nasal Swab

#### Adult Bovine Enteric Disease Panel (95506) $89
- Qualitative Fecal
- Salmonella Culture & Susceptibility
- *Clostridium perfringens* Culture
- Bovine Coronavirus Winter Dysentery PCR
- Feces and Anaerobic Fecal Swab (Anaerobic Transport such as Starplex™ Starswab Anaerobic Transport System or BBL Port-A-Cult™)

For viral swabs, place synthetic swabs (rather than cotton) in a leakproof tube with 0.5-1 mL saline or PBS. For bacterial isolation, please use sterile container with no additives or anaerobic transport for *Clostridium perfringens* culture.

### Transition Cow Panels

#### Core panel (50998) $22/animal*
- NEFA and BHBA

#### Metabolic profile (50245) $24/animal*
- Albumin, BUN (SUN), NEFA, AST activity, and BHBA

#### Vitamin Profile (50229) $32/animal*
- Vitamin A, Vitamin E-cholesterol ratio, and beta-Carotene

#### Primary Trace Nutrient Panel (50701) $30/animal*
- Cobalt, copper, manganese, molybdenum, selenium, zinc

#### Electrolyte & Primary Trace Nutrient Panel (50702) $52/animal*
- Primary trace nutrient panel plus calcium, phosphorus, magnesium, sodium, potassium, bicarbonate, and chloride

* Price is based on submission of 11 or more animals; check Web site for prices with fewer animals per submission.

In our fall newsletter we announced our intention to bundle commonly requested tests for disease syndromes into easy-to-order panels that are less expensive than ordering each test separately. The fall newsletter focused on equine, canine, and feline diseases. The response to that newsletter was extraordinary. Featured in this newsletter are diagnostic test panels for respiratory and enteric diseases in neonatal calves, calves, and adult cattle. Our intent was to create panels that include diagnostic tests that detect the most common pathogens of each age group of cattle and, at the same time, include diagnostic tests capable of detecting a broad range of pathogens. We have provided information on the optimal sample type, container, swab, and transport medium for each panel. In some cases we provide alternatives for sample type, e.g., lung or tracheal wash and nasal swab. The word or provides you with a choice of samples; the word and means we need both samples listed. The diagnostic test panels shown here do not include all of the tests we offer for respiratory or enteric diseases of cattle. Please view our Web page at http://animalhealth.msu.edu for additional test options.

We also offer a Field Necropsy testing service (code 30018) through the Anatomic Pathology Section. The Field Necropsy option may include a mix of formalin-fixed and fresh chilled tissues for gross and microscopic examination followed by further testing through the Microbiology sections, at the discretion of the pathologist. In addition to the new test panels, we have listed existing test panels offered through our Nutrition Section that have been developed for the "Transition" dairy cow. The prices for transition cow panels are discounted when samples from 11 or more cattle are submitted. Please check our Web page for additional information. Also, please contact us if you have questions or comments concerning the test panels.
Helpful Reminders to Enhance Your DCPAH Experience

DCPAH on the Road!

This winter DCPAH will take its exhibit booth to the three conferences listed below. If you plan to attend any of them, please stop by to say hello! We really enjoy meeting our clients and always receive great ideas when we have an opportunity to interact with you in person. Swing by the booth to pick up our latest CD, which is full of all the information you need for testing with us. Mention that you read this newsletter and receive a free token of our appreciation!

North American Veterinary Conference
Orlando, Florida - January 16-20
Booth 321

Michigan Veterinary Conference
Lansing, Michigan - January 29-31
Booth 83

Midwest Veterinary Conference
Columbus, Ohio - February 25-28
Booth 631

Biopsy Mailers

Uncertain of the best way to send DCPAH your tissue samples for biopsy? Try one of our biopsy mailers. They come in multiple sizes and shipping methods and contain everything but the tissue and formalin! They’re suitable for shipping even in the winter months if you remember this tip: Add a small amount of isopropyl alcohol to the formalin specimen container (1 part alcohol to 10 parts formalin) to help prevent freezing and thawing damage to the tissue specimen. Please contact us at 517.353.1683 to select from the following options:

USPS Small (99004) $5.00
- Holds 2 biopsy jars and includes pre-paid USPS shipping

FedEx Small (99124) $6.25
- Holds 2 biopsy jars and includes pre-paid FedEx shipping

FedEx Large (99114) $12.00
- Holds 4 biopsy jars and includes pre-paid FedEx shipping

Please Note

DCPAH’s Holiday Hours

Holiday hours of operation, including specimen drop-off and telephone coverage, will be from 8:00 a.m. to 1:00 p.m.

Thursday, December 31, 2009
Friday, November 27, 2009
Thursday, December 24, 2009
Friday, November 27, 2009

DCPAH will operate on the following university holidays:

Biopsy Mailers

Uncertain of the best way to send DCPAH your tissue samples for biopsy? Try one of our biopsy mailers. They come in multiple sizes and shipping methods and contain everything but the tissue and formalin! They’re suitable for shipping even in the winter months if you remember this tip: Add a small amount of isopropyl alcohol to the formalin specimen container (1 part alcohol to 10 parts formalin) to help prevent freezing and thawing damage to the tissue specimen. Please contact us at 517.353.1683 to select from the following options:

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