Many pathogens have the potential to induce acute gastroenteritis in dogs, but determining whether these are the cause of the clinical signs, and deciding how to manage suspect cases can be problematic. Part two of this article begins by discussing the indications for pathogen testing and the interpretation of the results obtained. Case management is then reviewed with a focus on the controversy surrounding antimicrobial therapy.

Key words: Canine gastroenteritis, infection, diagnosis, antimicrobial, supportive therapy

Introduction
Infectious agents are understood to be a major cause of gastroenteritis in dogs, and as discussed in part one of this article, there is a long list of potential pathogens that can infect the canine gastrointestinal (GI) tract. However, diagnosing the specific infectious agents responsible for diarrhoea can be very challenging. This may be due to financial limitations, detection of incidental pathogens, or lack of available tests for recently identified microorganisms. This article will first examine which diagnostic tests are suitable for which gastroenteritis cases, and consider the interpretation of the results obtained. This is followed by recommendations for the optimal management of infectious gastroenteritis cases. This includes isolation, use of intravenous fluid therapy, gastro-protectants, analgesia and anti-emetics. Particular emphasis is given to discussion of the value of antimicrobial agents in gastroenteritis cases, as there is significant debate in the veterinary field as to which, if any, antimicrobial therapies are warranted in treating acute gastroenteritis in dogs.

Cases for which pathogen testing may be recommended
A detailed clinical history and thorough clinical examination can often be sufficient to determine whether an infectious disease is likely. Box 1 summarises features of a case that should raise suspicion of an infectious agent.

Box 1: Case findings that suggest an infectious cause

Clinical History
- Recent contact with another acute gastroenteritis case
- Ingestion of raw or under cooked meat products
- Recent visit to a veterinary practice/hospital
- Young age (<1 year)

Clinical exam
- Pyrexia (>39.5°C)
- Haemorrhagic gastroenteritis
- Severe depression or lethargy

Following the clinical examination, a simple next step in investigating the likelihood of infectious disease is to perform a complete blood count (CBC). Examination of the total and differential white cell counts, in conjunction with

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white blood cell morphology assessment via a blood smear, can help evaluate the risk of an infectious agent. Table 1 lists the features of haematological analysis that strongly suggest an infectious process is occurring. Figure 1 presents a blood smear illustrating some of these characteristics.

If the clinical picture and preliminary laboratory tests fit with the possibility that an infectious agent is the cause of acute gastroenteritis, then further testing for specific pathogens may be warranted.

**Pathogen specific tests available**

**Viruses**

The only virus for which patient-side testing is available is canine parvovirus (CPV). The most widely used patient-side CPV test is the SNAP® Parvo Test, IDEXX (Figure 2). This is able to detect the presence of CPV antigen in a rectal swab within 10 minutes. CPV has been reported as the cause of 58% of severe gastroenteritis cases in one UK study, with higher prevalence reported in some regions (Godsall et al. 2010). Given this high prevalence and the ease and low cost of the SNAP test, CPV patient-side testing is strongly advised for all dogs with severe gastroenteritis.

“CPV patient-side testing is strongly advised for all dogs with severe gastroenteritis”

A positive test, such as was obtained in the case illustrated in Figure 3, should trigger immediate isolation procedures. However, a negative test needs to be interpreted with caution. It has been shown that only 56% of CPV-positive samples are detected using patient-side tests (Desario et al. 2005). This can be because some cases only shed very low amounts of virus, which are undetectable by patient-side tests. Alternatively it may be too early in the course of infection to detect virus, as viral shedding typically only begins 4 days after infection (Meunier et al. 1985).

If patient-side CPV testing is not available, or if there is a high suspicion of CPV infection despite a negative patient-side test, then submission of a faecal sample to any laboratory offering PCR testing for CPV is recommended. PCR tests are able to detect the presence of tiny amounts of viral DNA, thus are much more sensitive than patient-side tests. Alternatively, the patient-side test should be repeated in 48 hours, to see if viral shedding has developed in the intervening period.

<table>
<thead>
<tr>
<th>Finding</th>
<th>Features</th>
<th>Reason</th>
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<tbody>
<tr>
<td>Neutrophilia</td>
<td>Neutrophil count &gt; 11.5 x 10^9/L</td>
<td>Activation of the innate immune response results in release of neutrophils from bone marrow, plus increased production</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>Neutrophil count &lt; 3 x 10^9/L</td>
<td>Some infectious agents target rapidly dividing cells e.g. canine parvovirus</td>
</tr>
<tr>
<td>Left shift</td>
<td>&gt; 0.3x10^9/L bands (immature neutrophils)</td>
<td>Bands are released into the circulation to meet increased demand</td>
</tr>
<tr>
<td>Toxic change</td>
<td>Dohle bodies (paule blue cytoplasmic inclusions), increased cytoplasmic basophilia, vacuolated cytoplasm</td>
<td>Accelerated production of neutrophils by the bone marrow to meet demand (NB toxic change is not caused by direct damage of neutrophils by pathogens)</td>
</tr>
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</table>

**Bacteria**

Commercial testing is available for a number of other common viruses that cause acute canine gastroenteritis. These include canine enteric coronavirus (CECoV), canine distemper virus (CDV), and less commonly, canine rotavirus. If detected, it is probable that these infectious agents are the cause of disease, but this will not necessarily affect case management. It is important to note that no commercial tests exist for several of the emerging viruses associated with gastroenteritis, for example canine astrovirus, canine norovirus and canine kobuvirus. Testing for these viruses is, at present, limited to research institutions only. Therefore it is essential to bear in mind that a negative result for infectious agents by commercial testing may be positive for an infectious agent not included in the panel.

**Faecal culture**

Faecal samples are plated onto specialized agar plates and growth of bacterial colonies is observed over the course of several days. Approximately 2–3g faecal material should be collected.