

PATHCHAT

Compiled by Dr Marcelle Myburgh and Dr Craig Corcoran,
Molecular Biology Laboratory.

Endorsed by the Ampath infectious diseases peer group.

Diagnosing Bacterial and Viral Gastroenteritis: The Role of Molecular Testing

Background

Infectious causes of gastroenteritis account for approximately 1.4 billion cases of diarrhoea globally and in excess of two million deaths every year. These infections can be caused by various bacteria, viruses and parasites. Traditional laboratory diagnostics have several shortcomings. Molecular testing (PCR) for infectious causes of gastroenteritis is now often used as the first line screening test due to its superior sensitivity, specificity and rapid turnaround time, facilitating early appropriate therapy and infection control. A case in point is the laboratory diagnosis of *Clostridium difficile*-associated diarrhoea where PCR has been used with great success in recent years.

Enteric bacterial pathogens

Bacterial gastroenteritis can range from mild to severe, and typically manifests with symptoms of vomiting, diarrhoea and abdominal discomfort. Many of the enteric bacterial infections arise as a result of ingestion of contaminated food. The most common causes are infections with *Salmonella* spp., *Campylobacter* spp., *Shigella* spp. and shiga toxin-producing *E.coli*. Although relatively easily cultivated on selective media in the laboratory, the identification can take several days. Molecular testing for the common agents of bacterial enteric infections can be performed rapidly, and is both sensitive and specific, often eliminating the need for culture.

Enteric viral pathogens

Viral gastroenteritis is an intestinal infection marked by watery diarrhoea, abdominal cramps, nausea or vomiting, and sometimes fever. Infection occurs due to the ingestion of contaminated food or water or contact with another infected person. The most common cause in children is rotavirus, where the infection may be severe in infants and young children. The other frequently detected viral pathogen is norovirus infection, which is seen in both children and adults, and is the most common cause of foodborne illness worldwide. Routine laboratory identification of viral pathogens is often performed by rapid antigen detection assays for rotavirus and enteric adenoviruses, without the other viral causes being detected. Antigen tests are either not available or perform poorly for the other viral causes of gastroenteritis. Molecular testing manages to close the diagnostic gap, allowing for the rapid, sensitive and specific detection of the most common viruses responsible for acute viral gastroenteritis.

Molecular tests available at Ampath

Separate enteric bacterial and viral multiplex PCR panels are now available (Table 1). *Clostridium difficile* PCR can also be requested as a separate test. The recommended specimen for these tests is stool.

Table 1: Bacterial and viral gastroenteritis multiplex PCR panels

Bacterial gastroenteritis multiplex PCR	Viral gastroenteritis multiplex PCR
<ul style="list-style-type: none"> • <i>Campylobacter</i> spp. (jejuni and coli) • <i>Salmonella</i> spp. • <i>Shigella</i> spp. • Enteroinvasive <i>E. coli</i> (EIEC) • Shiga toxins (stx1 and stx2) found in Shiga toxin-producing <i>E. coli</i> [STEC] and <i>Shigella</i> dysenteriae 	<ul style="list-style-type: none"> • Rotavirus • Norovirus genogroup 1 and 2 • Adenovirus • Astrovirus • Sapovirus

Interpretation of the results

- A positive result indicates the presence of the particular organism in the specimen and the likely cause of the infective gastroenteritis.
- A negative result indicates the absence of the organisms tested for. It does not rule out infection with other enteric pathogens not specifically tested for.
- These PCRs should be used to establish an initial diagnosis and not to determine response to therapy or resolution of the infection.
- These PCRs are not intended to be used to determine carriage of the organism in the gastrointestinal tract.

Key points

- Both bacterial and viral gastroenteritis multiplex PCR panels are available and test for the most common causes of infective gastroenteritis.
- Advantages of molecular testing for viral and bacterial gastroenteritis pathogens include the following:
 - Superior sensitivity and specificity
 - Short turnaround time
 - Closure of the diagnostic gap for certain viruses

References available on request.