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Faecal Multiplex PCR

For accurate and timely diagnosis of gastroenteritis

Gastroenteritis is a common presentation in both adults and children. Most acute cases are due to infection, with chronic cases more likely to be due to non-infectious causes such as inflammatory bowel disease or malabsorption syndrome. When infectious diarrhoea is suspected, two decisions need to be made: firstly, when to perform stool testing, and secondly, whether antibiotic therapy is required.

Most infectious diarrhoea is mild and self-limiting. In such instances, supportive therapy, such as rehydration, is sufficient, and microbiological testing is not required[1]. However, in patients with severe illness and/or high-risk comorbidities, a diagnosis will help guide further management.

Who to test

Patients with severe illness

- Dehydration/hypovolaemia
- Hospitalisation
- Fever > 38°C
- Bloody diarrhoea/dysentery

Patients with co-morbidities

- Age > 70
- Malignancy
- Immunosuppressed
- Inflammatory bowel disease
- Pregnancy

Additional reasons to test

- Prolonged symptoms > 1 week
- Recent antibiotic exposures (*C.difficile* only)
- If directed by public health/ outbreak investigations

Causes of infectious gastroenteritis and respective testing

Infectious diarrhoea can broadly be categorised according to its aetiology: bacterial, viral or parasitic. Viral causes are the most common, while bacterial causes are more likely to cause severe illness[2]. Identifying the underlying aetiology assists with ongoing management (see Table 1 below).

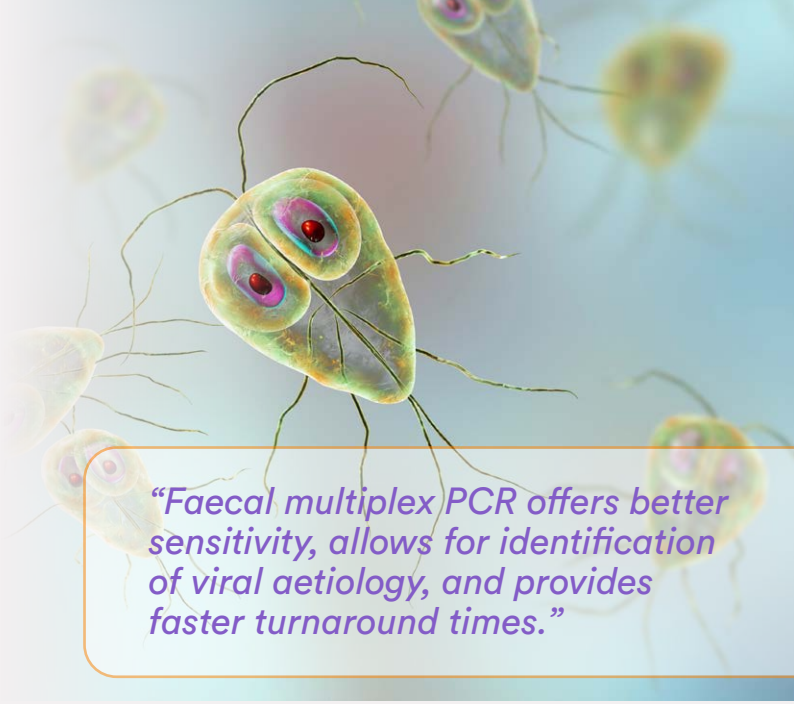
Table 1. Pathogens and diagnostic testing available at Clinical Labs

Bacteria	Testing	Comments
Campylobacter	Culture	Accounted for 94% of national notifiable enteric diseases in 2017[3]. PCR cannot differentiate between typhoid/ non-typhoid strains.
Salmonella	Culture. Culture is required for serotyping of Typhi/non-Typhi strains. Blood cultures in returned travellers suspicious of typhoid fever.	
Shigella	Culture	Can cause dysentery.
C.difficile	PCR	May be bowel commensals (especially in children <2 years old). Test only in symptomatic patients with recent antibiotic exposure.
Viruses	**Testing**	**Comments**
Rotavirus	Faecal Multiplex PCR	Can be vaccinated. Common cause of childhood diarrhoea.
Norovirus	Faecal Multiplex PCR	Common cause of outbreaks in nursing homes/schools.
Adenovirus	Faecal Multiplex PCR	Most adenoviruses can cause gastroenteritis. Adenovirus F40/ F41 common cause of gastroenteritis outbreaks in children.
Enterovirus, astrovirus, sapovirus, bocavirus	Faecal Multiplex PCR	
Parasites	**Testing**	**Comments**
Giardia spp.	OCP microscopy/Faecal Multiplex PCR	
Cryptosporidium spp.	OCP microscopy/Faecal Multiplex PCR	
Entamoeba histolytica	OCP microscopy/Faecal Multiplex PCR	Cause of dysentery and liver abscess in returned travellers.
Dientamoeba fragilis, Blastocystitis hominis	OCP microscopy/Faecal Multiplex PCR	Pathogenicity has not been established. Treatment is not routinely recommended. Exclude other causes in the first instance..
Helminths – e.g. Enterobius, Strongyloides, Taenia, Schistosomiasis	OCP microscopy only. Serology available for certain helminths.	Seen mainly in returned travellers. Travel history important. Collect 3 x specimens to improve sensitivity.

Benefits of faecal PCR testing

Multiplex PCR has become more readily available and commercially affordable, offering many advantages over traditional culture testing. PCR offers better sensitivity, allows for identification of viral aetiology, and provides faster turnaround times.

Although faecal multiplex PCR offers many benefits, referrers need to be aware of the following: Identification of the pathogen genome does not necessarily indicate disease. This is most classically seen with *C.difficile*, which is a bowel commensal and may not cause disease in healthy individuals. Similarly, in immunosuppressed patients, persistent viral shedding can often be found and does not represent active infection.



"Faecal multiplex PCR offers better sensitivity, allows for identification of viral aetiology, and provides faster turnaround times."

Are faecal culture and faecal microscopy still needed?

Faecal microscopy and culture have remained the gold standard for many years and are still commonly requested. PCR will only identify the specific pathogens on the testing panel, potentially missing other causes of infection. Also, PCR does not allow for antimicrobial susceptibility testings for bacterial pathogens. Therefore, stool cultures remain an important part of microbiological workup.

Faecal culture

Faecal culture continues to be routinely performed and will identify many bacterial pathogens. However, one of its weaknesses is the failure to identify viral pathogens, which account for a significant number of infectious diarrhoea, particularly in children.

Faecal microscopy

Faecal microscopy is another important diagnostic tool, particularly when a parasitic cause is suspected, such as in returned travellers or those with agricultural exposure. In these instances, patient history should be included on the request, and specific ova, cyst, parasite (OCP) microscopy should be requested as these samples require special processing in the laboratory. Sensitivity of microscopy is time-dependent and can vary significantly depending on the stage of illness and severity. Three specimens are recommended for increased sensitivity.

How to order Faecal Multiplex PCR Testing

Request 'Faecal Multiplex PCR' using the standard Clinical Labs request form. This will test for the viral and parasitic pathogens as listed in Table 1. Faecal M/C/S will also be completed by the lab.

Additional tests:

- In patients with gastrointestinal symptoms suggestive of inflammatory or functional bowel disease of more than 6 weeks' duration a Faecal Calprotectin test may be ordered.
- Faecal occult bloods can also be requested.
- If helminth parasites (worms) are suspected, then add OCP.
- *C. difficile* needs to be specified as an additional test on the request form.
- If Strongyloides is suspected, please also request Strongyloides serology (serum sample).

Specimens required:

A fresh faecal sample in brown top container. Frozen faecal samples are also accepted; however, culture cannot be performed on these.

Test cost:

Bulk-billing is available through Medicare.

References

1. Acute infectious diarrhoea [published 2019 Apr; amended 2022 Aug]. In: Therapeutic Guidelines. Melbourne: Therapeutic Guidelines Limited; accessed {accessed 16/12/2022}. https://www-tg-org-au.qelibresources.health. wa.gov.au
2. Shane AL, Mody RK, Crump JA, Tarr PI, Steiner TS, Kotloff K, Langley JM, Wanke C, Warren CA, Cheng AC, Cantey J, Pickering LK. 2017 Infectious Diseases Society of America Clinical Practice Guidelines for the Diagnosis and Management of Infectious Diarrhea. Clin Infect Dis. 2017 Nov 29;65(12):e45-e80. doi: 10.1093/cid/cix669. PMID: 29053792; PMCID: PMC5850553.
3. OzFoodNet Working Group. Monitoring the incidence and causes of disease potentially transmitted by food in Australia: Annual report of the OzFoodNet network, 2017. Commun Dis Intell (2022). 2022 Sep 26;46. doi: 10.33321/cdi.2022.46.59. PMID: 36154653.

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Dr Eric Chu graduated from The University of Western Australia with a Bachelor of Medicine/Bachelor of Surgery in 2007. He undertook his post-graduate training primarily at Sir Charles Gairdner Hospital, and completed his clinical microbiology and physicians training in infectious diseases. He obtained dual fellowship in 2020 after additional training at Fiona Stanley Hospital, PathWest and Princess Margaret Hospital. Eric currently works as an Infectious Diseases Physician at Sir Charles Gairdner Hospital and joined Australian Clinical Labs as a clinical microbiologist in 2020.

Local pathologist

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Dr Linda Dreyer completed her undergraduate studies in 1996, receiving a Bachelor's degree in Medicine and Surgery (MBChB) from the Faculty of Health Sciences, University of Pretoria, South Africa. Following four years of clinical practice as a Medical Officer in the Department of Family Medicine, she commenced specialisation in 2000. She was appointed as Registrar in Clinical Virology at the University of Pretoria/ Gauteng Province, where she worked for two years. In 2003, she was appointed as Senior Registrar in Microbiology. Dr Dreyer received her Master's degree in Clinical Microbiology (MMed (Path)) from the University of Pretoria in 2006. She worked as a consultant for the National Health Laboratory Services (NHLS) in Pretoria until January 2008. During her time at NHLS, she was involved in teaching medical students and microbiology registrars, and gave lectures to nursing staff, medical students, and specialists. She also sat on the Infection Control Committee and the Antimicrobial Stewardship Committee of the Pretoria Academic Hospital. In 2008, she came to Melbourne and joined Australian Clinical Labs (formerly Healthscope Pathology) as a Senior Registrar, and obtained Fellowship of The Royal College of Pathologists of Australasia (FRCPA) in 2010. Dr Dreyer has special interests in the appropriate use of antimicrobials, infection control, and molecular diagnostic assays in contemporary clinical microbiology.