

# LabCorp Capsule

## Norovirus Detection by RT-PCR

### Background

Noroviruses (Norwalk-like viruses) are members of the *Caliciviridae* family, which includes Norwalk and other related viruses. The human noroviruses can be divided into two groups, the Norwalk-like viruses and Sapporo-like viruses.<sup>1</sup> These viruses are similar in size and morphology and demonstrate nucleotide sequence homology but are antigenically distinct. The different viral groups have been named after the geographical locations where outbreaks have occurred. Examples of the different viral groups include Norwalk, Snow Mountain, Toronto, and Sapporo. Within the Norwalk-like viruses, genetic analysis has provided a further subdivision based on gene sequence similarity. The Norwalk-like viruses are subdivided into genogroup 1 (Norwalk virus) and genogroup 2 (Snow Mountain, Hawaii, Toronto).<sup>1</sup>

### Pathogenesis

Norwalk virus and other caliciviruses cause nonbacterial acute gastroenteritis.<sup>1,2</sup> Symptoms include acute diarrhea and vomiting, abdominal cramps, headache, nausea, fatigue, and low-grade fever.<sup>2</sup> This group of symptoms is often referred to as “stomach flu,” even though the illness is not caused by influenza viruses. Symptoms occur within 24 to 48 hours after exposure to the virus and usually last one to three days. Most cases are mild, but complications—mainly related to dehydration—can occur in young, elderly, and immunocompromised individuals.<sup>3</sup> Nonbacterial gastroenteritis is second only to the common cold as a cause of morbidity in the US. Norwalk virus accounts for as many as 50% of viral gastroenteritis cases.<sup>4</sup> Other agents associated with nonbacterial gastroenteritis include rotaviruses, astroviruses, and adenoviruses.

### Epidemiology

Noroviruses are spread by the fecal–oral route, most often via contaminated food or water.<sup>2</sup> The virus can also be spread secondarily by person-to-person contact.<sup>2,5</sup> Contaminated water

is the most frequent source of outbreaks, with shellfish and salad ingredients the most common sources of contaminated food. Outbreaks of viral gastroenteritis most often occur in institutional or group settings.<sup>2</sup> These include schools, child-care facilities, nursing homes, banquet facilities, cruise ships, dormitories, and campgrounds. Between 1997 and 2000, 284 nonbacterial (viral) gastroenteritis outbreaks were reported to the CDC. The majority of these were associated with Norwalk virus.<sup>6</sup> In 2002 significant outbreaks were reported on a series of cruise ships.<sup>5</sup> These outbreaks demonstrated how readily noroviruses can be transmitted within a closed environment. Even though most adults have serum antibodies to Norwalk-like viruses, the antibodies do not seem to offer protection from reinfection.

### Laboratory Methods

Noroviruses cannot be cultured, so the diagnostic options include electron microscopy, immune-electron microscopy, serology and reverse-transcription polymerase reaction (RT-PCR). Seroprevalence studies indicate that the majority of the adult population has serum antibodies to Norwalk-like viruses.<sup>1</sup> Serum antibodies are uncommon in children and appear to be acquired in early adulthood. Serological assays either measure the presence of virus-specific IgM antibodies, or rising antibody titers in paired (acute versus convalescent phase) sera. At present, these methods are limited in availability. This, coupled with the fact that studies have shown it may take several days post exposure/inoculation to develop IgM antibodies,<sup>7</sup> makes serological assays of limited diagnostic utility. Currently the most commonly used method to detect and differentiate noroviruses is RT-PCR testing for virus shed into stool specimens.<sup>8,9</sup> Most of the RT-PCR assays target the RNA polymerase gene because it is well conserved among the different noroviruses. The RT-PCR format offers the ability to detect lower levels of the virus, as well as a broad-spectrum of viruses from both genogroup 1 and genogroup 2.<sup>8,9</sup> For these reasons, RT-PCR testing for noroviruses can be valuable in the evaluation of outbreaks.

## References

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### Norovirus Detection, RT-PCR . . . . . 138307

CPT 87798

**Synonyms** Norwalk virus, human calicivirus, Norovirus

**Test Includes** RT-PCR detection of Norovirus Genogroup 1 (ie, Norwalk virus) and Genogroup 2 (Snow Mountain Agent)

**Specimen** Stool or emesis

**Volume** 5.0 mL (stool) or 500 mg (emesis)

**Minimum Volume** 1.0 mL (stool) or 250 mg (emesis)

**Container** Sterile collection cup

**Storage Instructions** Refrigerate for one to three days; **Freeze** after three days.

**Causes for Rejection** Insufficient volume; specimen leakage.

**Use** In conjunction with clinical presentation and other laboratory tests for the identification and diagnosis of norovirus (Norwalk virus) infection.

**Methodology** Reverse transcription polymerase chain reaction (RT-PCR)

#### References

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