

Molecular diagnostics of viral gastroenteritis

Rapid and reliable detection by real-time PCR

- RIDA®GENE Norovirus
- RIDA®GENE Norovirus I & II
- RIDA®GENE Viral Stool Panel I
- RIDA®GENE Viral Stool Panel II
- RIDA®GENE Viral Stool Panel III
- RIDA®GENE Sapovirus
- RIDA®GENE Enterovirus



Gastroenteritis – one of the most common diseases in the world

Acute gastroenteritis is a major cause of morbidity and mortality worldwide. Enteric viruses are the most common cause of gastroenteritis, particularly in children. Diarrhoea is estimated to cause about 1.5 million deaths in children under the age of five, more than AIDS, malaria and measles together. The most important causative viral agents of diarrhoea are norovirus, rotavirus, adenovirus and astrovirus, as well as sapovirus and enterovirus.

Noroviruses belong to the family of *Caliciviridae* and are single-stranded RNA (ssRNA) viruses. Gastroenteritis caused by norovirus is manifested by severe nausea, vomiting and diarrhea. Human pathogens have been described for genogroup I (GI), genogroup II (GII) and genogroup IV (GIV). Noroviruses cause by far the most cases of viral gastroenteritis outbreaks.^{1, 2, 3} The CDC estimates more than 21 million cases of acute gastroenteritis each year in the United States.⁴

Rotaviruses belong to the *Reoviridae* family of double-stranded RNA (dsRNA) viruses. Human infections are only caused by serogroup A, B and C. Symptoms of rotavirus infection are usually vomiting, watery diarrhoea and abdominal pain. It is the main cause of diarrhoea in children aged under five and is responsible for the death of an estimated 611,000 children worldwide each year.⁵

Adenoviruses belong to the *Adenoviridae* family of double-stranded (dsDNA) viruses. One differentiates 56 serotypes of human adenoviruses and they are classified into seven groups (A - G). Adenoviruses mainly cause respiratory diseases, whereas Gastroenteritis is primarily caused by serotype 40 and 41.^{6, 7}

Astroviruses are single-stranded (ssDNA) viruses and belong to the family of *Astroviridae*. An astroviral dependent Gastroenteritis is primarily manifested by diarrhoea, but may be accompanied by vomiting and fever. In developed countries, the Astrovirus incidence rates between 2 - 9 %, mainly affecting children under the age of two.⁸ To date, serotypes 1 - 5 are most relevant.⁹

Sapoviruses are part of the family of *Caliciviridae* and are also major causative agents of gastroenteritis worldwide. Highest incidence is described for children under the age of five, but sapovirus outbreaks have been detected in adults as well.¹⁰ Clinical symptoms are similar to those of norovirus infections including diarrhea, vomiting and fever. However self-limited sapovirus infections lead to much milder gastroenteritis compared to norovirus-induced gastroenteritis.

Human enterovirus comprise a variety of different subtypes: poliovirus, coxsackie virus A and B, human enterovirus 70/71 and echovirus and infections are usually asymptomatic or present with mild cold-like symptoms. Severe enterovirus infections are poliomyelitis, Hand, Foot, and Mouth disease, meningitis and myocarditis.¹¹ Coxsackie viruses are present worldwide and can cause the so called “summer diarrhea”. Other severe infections with coxsackie virus or human enterovirus 70/71 can lead to conjunctivitis and myocarditis, whereas echovirus infections can result in aseptic meningitis with echovirus 30 being the most common meningitis causing serotype in Europe, America and Asia.¹²

¹ Mead PS, et al. Food- related illness and death in the United States. *Emerging infectious diseases*, 1999; 5: 607-625.

² Glass R. J., et al. The epidemiology of enteric caliciviruses from humans: a reassessment using new diagnostics. *The Journal of infectious diseases*, 2000; 181(Suppl 2): S254-261.

³ Evan H. S., General outbreaks of infectious intestinal disease in England and Wales, 1995 and 1996. *Communicable Disease and Public Health*, 1998, 1:165-171.

⁴ Centers for Disease Control and Prevention. *Norovirus: Overview 2012*.

⁵ Parashar U. D., et al. Rotavirus and Severe Childhood Diarrhea. *Emerging Infectious Diseases*, 2006, 12(2): 304-306.

⁶ Robert Koch Institut. *Keratoconjunctivitis epidemica und andere Konjunktividen durch Adenoviren*. RKI-Ratgeber Infektionskrankheiten – Merkblätter für Ärzte 2010.

⁷ Robinson C. M., et al. Molecular evolution of human species D adenoviruses. *Infection, Genetics and Evolution*, 2011, 11(6): 1208-1217.

⁸ Guix S., et al. Human astrovirus diagnosis and typing: current and future Prospects. *Letters in applied microbiology*, 2005, 41(2): 103-105

⁹ Wilhelmi I., et al. Viruses causing gastroenteritis. *Clinical microbiology and infection*, 2003, 9(4): 247-262.

¹⁰ Hugo Johansson P. J., et al. A nosocomial sapovirus-associated outbreak of gastroenteritis in adults. *Scandinavian journal of infectious diseases*, 2005, 37(3): 200-204

¹¹ De Crom et al. Enterovirus and parechovirus infection in children: a brief overview. *European journal of pediatrics*, 2016, 175(8): 1023-9

¹² Robert-Koch-Institut, *Epidemiologisches Bulletin* 7. Oktober 2013. Häufungen von Echovirus-30-bedingten Meningitiden 2013

RIDA®GENE Norovirus Art. Nr. PG1405


- Multiplex real-time RT-PCR
- Detection of all human pathogenic genogroups

RIDA®GENE Norovirus I & II Art. Nr. PG1415


- Multiplex real-time RT-PCR
- Simultaneous detection and differentiation of Norovirus GI and GII

RIDA®GENE Viral Stool Panel I Art. Nr. PG1315


- 5-plex real-time RT-PCR
- Simultaneous detection and differentiation of Norovirus, Rotavirus, Adenovirus 40/41 and Astrovirus

RIDA®GENE Viral Stool Panel II Art. Nr. PG1325


- Multiplex real-time RT-PCR
- Simultaneous detection and differentiation of Rotavirus, Adenovirus 40/41 and Astrovirus

RIDA®GENE Viral Stool Panel III Art. Nr. PG1335


- Multiplex real-time RT-PCR
- Simultaneous detection and differentiation of Norovirus, Rotavirus und Adenovirus 40/41

RIDA®GENE Sapovirus Art. Nr. PG1605


- Multiplex real-time RT-PCR
- Detection of Sapovirus

RIDA®GENE Enterovirus Art. Nr. PG4705


- Multiplex real-time RT-PCR
- Detection of human Enterovirus 70/71, Poliovirus, Coxsackievirus and Echovirus

RIDA® GENE real-time PCR for viral gastrointestinal infections – detection overview

	RIDA® GENE Norovirus	RIDA® GENE Norovirus I & II	RIDA® GENE Viral Stool Panel I	RIDA® GENE Viral Stool Panel II	RIDA® GENE Viral Stool Panel III	RIDA® GENE Sapovirus	RIDA® GENE Enterovirus
Detection	Norovirus	Norovirus GII	Adenovirus Norovirus	Rotavirus	Norovirus	Sapovirus	Enterovirus
			Rotavirus	Astrovirus	Rotavirus		
		Norovirus GI	Astrovirus	Adenovirus	Adenovirus		
Thermal profile	• Universal profile						
Time to result	~ 60 - 90 min*						
Controls	<ul style="list-style-type: none"> • Positive control • Negative control • Internal control RNA 						

* Dependent on the instrument used.

Ordering information

Product	Description	Tests	Matrix	Art. No.
RIDA® GENE	Real-time PCR			
RIDA® GENE Viral Stool Panel I	Multiplex real-time RT-PCR for the direct qualitative detection and differentiation of Norovirus, Rotavirus, Adenovirus 40/41 and Astrovirus in human stool samples	100	Stool	PG1315
RIDA® GENE Viral Stool Panel II	Multiplex real-time RT-PCR for the direct qualitative detection and differentiation of Rotavirus, Adenovirus and Astrovirus 40/41 in human stool samples	100	Stool	PG1325
RIDA® GENE Viral Stool Panel III	Multiplex real-time RT-PCR for the direct, qualitative detection and differentiation of Norovirus, Rotavirus and Adenovirus 40/41 in human stool samples.	100	Stool	PG1335
RIDA® GENE Norovirus	Multiplex real-time RT-PCR for the direct qualitative detection of Norovirus (genogroup I and II) in human stool samples	100	Stool	PG1405
RIDA® GENE Norovirus I & II	Multiplex real-time RT-PCR for the direct qualitative detection and differentiation of Norovirus genogroup I and genogroup II in human stool samples	100	Stool	PG1415
RIDA® GENE Sapovirus	Multiplex real-time RT-PCR for the direct qualitative detection of Sapovirus in human stool samples	100	Stool	PG1605
RIDA® GENE Enterovirus	Multiplex real-time RT-PCR for the direct qualitative detection of Enterovirus (Poliovirus, Echovirus, Coxsackievirus, human Enterovirus 70/71) in human stool and cerebrospinal fluid	100	Stool/CSF	PG4705