

For the Primer, visit [doi:10.1038/nrdp.2017.83](https://doi.org/10.1038/nrdp.2017.83)

➔ Rotavirus infections are one of the leading causes of diarrhoeal diseases in children <5 years of age and can also lead to vomiting, fever and malaise. Ten species of rotavirus have been identified, although species A rotaviruses are the most common cause of infection in children.

PREVENTION

Two rotavirus vaccines are broadly used worldwide: the RV5 vaccine and the RV1 vaccine

MECHANISMS

Rotaviruses infect and replicate in mature enterocytes and enteroendocrine cells in the small intestine. The diarrhoea caused by rotavirus infection might be due to malabsorption (due to a reduced absorptive function or the loss or destruction of enterocytes) or the effects of the viral enterotoxin non-structural protein 4. In addition, activation of the enteric nervous system has been proposed to underlie rotavirus-associated diarrhoea. Indeed, serotonin release from enteroendocrine cells can activate nerves that innervate the small intestine, leading to increased intestinal motility and vomiting (via vagal afferents that project to the vomiting centre in the brain).

Rotavirus is transmitted through the faecal-oral route; only a few virions are needed to cause disease in susceptible individuals

DIAGNOSIS

Rotavirus disease cannot be distinguished from diarrhoeal diseases caused by other infectious agents on the basis of clinical signs alone. For laboratory-confirmed diagnosis, rotavirus can be detected in stools using enzyme-linked immunosorbent assay, immunochromatography or reverse transcription-PCR.

! Although rotavirus infections are common throughout life, the severity of disease decreases with repeat infections

OUTLOOK

Understanding the correlates of protection from rotavirus is essential to improve the efficacy of current vaccines and to develop next-generation vaccines.

RV1 is a live attenuated, monovalent human virus vaccine containing rotavirus strain 89-12 of genotype G1P[8]

RV5 is a live attenuated, pentavalent vaccine composed of five bovine-human mono-reassortant rotaviruses that express human VP7 (G1-G4) or VP4 (P[8])

Both vaccines efficiently prevent severe rotavirus-associated disease in high-income countries but reduce the incidence of rotavirus diarrhoea by only 50-60% in low-income countries

An entirely plasmid-based reverse genetics system for rotavirus can be used to engineer viruses of defined genetic composition and has great potential for basic and translational research

EPIDEMIOLOGY

In 2003, 114 million cases of rotavirus infection were reported in children <5 years of age worldwide and, of these, 2.3 million cases required hospitalization.

In 2013, >200,000 cases of fatal rotavirus infection were reported. More than 90% of children with fatal rotavirus infections live in low-income countries, where there is a high prevalence of comorbid conditions and they have limited access to health care.

In countries that introduced rotavirus vaccines into the national child immunization schedule, all-cause diarrhoeal deaths were reduced by a median of 42% in the first 10 years

MANAGEMENT

Management of rotavirus infection is non-specific; all children presenting with acute diarrhoea are assessed for dehydration and treated accordingly, regardless of the infecting agent. Fluid and electrolyte management is the mainstay of therapy for children with acute diarrhoea. Oral rehydration therapy is indicated in children with mild or moderate dehydration; intravenous therapy is indicated in children with severe dehydration, hyperemesis or severe electrolyte imbalances. In addition, dietary management is important to maintain adequate protein-calorie intake.



Mild cases of rotavirus disease require observation only, whereas more severe disease (such as repeated watery diarrhoea and severe vomiting) requires treatment