

ENTERIC VIRUSES

THE ORGANISM/TOXIN

Enteric viruses other than hepatitis A virus and Norwalk-like viruses have occasionally been implicated in foodborne disease. These include:

Rotaviruses, astroviruses, hepatitis E virus, picornaviruses, adenoviruses and parvoviruses. Most of the enteric viruses contain RNA rather than DNA, the exceptions being adenoviruses and parvoviruses. Foodborne enteric viruses are inert particles which do not replicate in food. They require human cells to multiply. Enteric viruses can pass through the gastrointestinal tract and are resistant to environmental stresses, including heat and acid. Most enteric viruses are stable at pH 3.0 and in the presence of lipid solvents. They resist freezing and drying. All foodborne viruses are transmitted by the faecal-oral route and are human-specific (although animal strains of the same virus may also exist).

ROTAVIRUSES

Rotaviruses are the major cause of childhood gastroenteritis world-wide. In developing countries, deaths are common among children < 5 years. Although the disease occurs in all age groups, it is mild and inapparent in adults. Infection is generally not recognised as foodborne but outbreaks associated with food and water have been reported in a number of countries. Many rotaviruses can be grown in cell culture. Rotaviruses infect both humans and animals; some human strains are closely related to animal strains.

Infectious dose : < 100 virus particles.

Survival. Human rotavirus can survive for several weeks in river water at 20°C and at 4°C.

Inactivation: Heating at 50°C for 30 min reduces infectivity by 99%, and infectivity is rapidly lost at pH levels < 3.0 and > 10.0. Normal cooking temperatures should be sufficient to inactivate rotaviruses.

Sources of infection: contaminated water, care-givers, foodhandlers, general adult population.

Overseas Outbreaks:

Between 1985-1990, 11 foodborne outbreaks involving 460 cases of rotaviral gastroenteritis were reported in New York. Seven outbreaks were associated with food-service premises. Implicated foods included salad, cold foods, shepherd's pie, and water/ice. Large-scale outbreaks of rotaviral gastroenteritis were reported in Japanese primary schools (> 3000 cases). School lunches prepared at a central facility were suspected as the vehicles but no rotavirus was isolated from foods or water. Waterborne rotaviral outbreaks have been reported in many countries, including US, Germany, Israel, Sweden, China, Russia.

ASTROVIRUSES

Astroviruses infect animals and humans and cause gastroenteritis. Some strains replicate in cell culture. Generally associated with infection in young children < 1 year although they may also cause a mild infection in adults. Epidemiological evidence of transmission by foods is limited, but infections via contaminated shellfish and water have been reported.

Infectious dose : < 100 virus particles.

Survival. Astroviruses survive heating for 30 min at 50°C.

HEPATITIS E VIRUS

Hepatitis E virus belongs to the calicivirus group and is non-culturable. It occurs widely in Asia, Africa and Latin America, where waterborne outbreaks are common. It has rarely been identified elsewhere. The virus infects the liver and symptoms of hepatitis are produced following a 22-60 day incubation period. The disease is self-limiting and does not progress to a carrier or chronic state. Transmission is generally via faecally-contaminated water and evidence for foodborne transmission has not been documented.

PICORNAVIRUSES

This group includes poliovirus, Coxsackie B viruses and ECHOviruses, many of which are culturable. They do not cause gastroenteritis but are transmitted by the faecal-oral route and excreted in faeces. Polioviruses were the first to be recognised as foodborne. Wild strains are now rare and NZ is a registered WHO polio-free zone. Outbreaks of foodborne illness associated with Coxsackie virus and ECHOvirus have been reported.

ADENOVIRUSES

Of the many types of adenovirus, only two types, 40 and 41, are generally associated with faecal-oral spread and gastroenteritis (especially in children). Most infections are subclinical or mild. The enteric adenoviruses, types 40 and 41, are difficult to grow in cell culture, whereas most other non-faecal types are culturable. Transmission is generally via faecally-contaminated water and evidence for foodborne transmission has not been documented.

PARVOVIRUSES

The role of parvoviruses in human gastroenteritis is uncertain, although clearly documented in some animal species. There is limited evidence of parvovirus association with foodborne disease but it has been linked with consumption of contaminated shellfish. Parvovirus was identified in all stools examined from a large UK gastroenteritis outbreak of >800 cases. This outbreak was attributed to consumption of contaminated cockles.

ADEQUATE PROCESSING GUIDELINES

N.B. These guidelines have been derived from published information. Industry is advised to ensure that processing steps they are using are adequate to meet their particular food safety objectives.

	Internal temperature reached	Time
Shellfish (temperature required to ensure inactivation of Hepatitis A virus)	90°C	1.5 min
Thoroughly wash all fruit and vegetables with potable water		
Ensure shellfish are harvested from approved shellfish gathering waters		
Avoid direct handling of food by infected food handlers		
Ensure all foodhandlers are trained in effective handwashing techniques (asymptomatic foodhandlers can cause infection)		
Thorough cleaning and disinfection must follow vomiting on food premises		
Boil, filter or chemically treat non-potable water before drinking		

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