

What is Norovirus?

Noroviruses (NoV) are small, round (approximately 27-35 nm in diameter), non-enveloped viruses which have a single stranded RNA genome. NoV are very diverse, with over 25 different strains which infect humans. NoV strains are grouped into at least five different genogroups, of which genogroup I, II and IV most commonly infect humans. Human NoV is the leading cause of non-bacterial gastroenteritis worldwide. Immunity to the virus is often short lived and new pandemics appear every 2-3 years. No effective vaccine to human NoV is currently available.

How is Norovirus transmitted?

- NoV is highly contagious and spreads via the faecal to oral route.
- Transmission can be person-to-person, through contaminated surfaces or through consumption of contaminated food and water.
- Foodborne illness accounts for 12-47% of all NoV cases worldwide.
- NoV can enter the aquatic environment via septic tank leachates, boat discharges, sewage discharges and people defecating or vomiting directly into waterways.
- Once NoV enters the aquatic environment, bivalve shellfish accumulate the viruses through the act of filter feeding.
- NoV is accumulated and retained within the digestive tissues of bivalves, persisting in tissues long after bacterial indicators of sewage contamination are detectable.

- Other seafood products may become contaminated by infected workers during processing if good hygiene practice is not followed.

What outbreaks have occurred?

Between 2001-2010, 17 Australian outbreaks of suspected shellfish related NoV illness were reported to OzFoodNet. Recent Australian outbreaks reported were in:

- 2008 following consumption of oysters from the Kalang River (NSW) causing illness in 40 people; and
- 2013 following consumption of oysters from Tasmania causing illness in over 500 people.

What are the symptoms?

- Vomiting (projectile in >50% of cases), stomach cramps, watery non-bloody diarrhoea, abdominal pain, low grade fever (< 50% of cases) and headaches.
- The incubation period is 10 – 50 hrs and symptoms generally last 24 – 60 hrs.
- Infected humans excrete high levels of NoV in their faeces ($\leq 10^{11}$ virus particles/g faeces) for up to 2-3 weeks, long after symptoms have ceased.

How much is a harmful dose?

The median infectious dose of NoV is estimated to be very low (18 virus particles), although the probability of becoming ill in susceptible individuals is dose-dependent.

How can the risk be minimised?

- Freezing and refrigeration does not eliminate NoV.

- Depuration is ineffective in eliminating viruses from shellfish.
- Cooking shellfish at temperatures exceeding 90 °C for greater than 90 seconds is likely to significantly reduce the level of infectious NoV, although heating at 60 °C for 30 minutes and pasteurisation are not sufficient to eliminate viruses.

What can be done to manage Norovirus in seafood?

- Regular sanitary/pollution source surveys of shellfish growing areas to identify potential faecal inputs and manage harvest accordingly.
- Regulation of shellfish harvesting areas to ensure adequate periods of closure following a faecal contamination event.
- Use of extended relay periods to cleanse shellfish grown in poor or unknown water quality.
- Prevention of contamination during processing of seafood through good hygiene and manufacturing practices.

Where can I access more information?

C.A.C. 2012. Guidelines on the application of general principles of food hygiene to the control of viruses in food. Codex Alimentarius Commission, Food and Agriculture Organization of the United Nations, World Health Organization.

GROHMANN, G. & LEE, A. 2003. Viruses, Food and Environment. In: HOCKING, A. D. (ed.) *Foodborne Microorganisms of Public Health Significance*. Sixth ed. New South Wales: Australian Institute of Food Science and Technology Inc.

ISO 2012. ISO/TS15216: Microbiology of food and animal feed - Horizontal method for determination of hepatitis A virus and norovirus in food using real-time RT-PCR.

PATEL, M. M., HALL, A. J., VINJÉ, J. & PARASHAR, U. D. 2009. Noroviruses: A comprehensive review. *Journal of Clinical Virology*, 44, 1-8.

TEUNIS, P. F. M., MOE, C. L., LIU, P., MILLER, S. E., LINDESMITH, L., BARIC, R. S., LE PENDU, J. & CALDERON, R. L. 2008. Norwalk virus: How infectious is it? *Journal of Medical Virology*, 80, 1468-1476.

How can we test for Norovirus?

Only molecular biology (real time RT-PCR) methods are able to detect and quantify NoV in shellfish. The limit of detection of the method is approximately 100 viral genomes per gram of shellfish gut. The method used cannot distinguish between infectious and non-infectious virus particles. Recently an ISO technical specification for the detection of NoV in shellfish was released (ISO/TS15216, 2012).

Regulatory standards

There are currently no formal regulatory criteria for NoV in Australia. Codex Alimentarius has developed guidelines on how to control viruses in foods, available at <http://www.codexalimentarius.org>, and testing for NoV following high risk events is recommended.

International regulatory limits can be found in the Trade & Market Access Database, available at www.frdc.com.au/trade.

Contact us:

<http://safefish.com.au>



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Considering the Benefits and Risks of Seafood Consumption

Eating seafood confers many benefits: it provides top-quality protein, and is an excellent source of important nutrients like iodine, selenium, vitamins A and D, and long-chain polyunsaturated omega-3 fatty acids. However like all foods, some seafood products may contain substances that are harmful to health. Illness from seafood is rare, so the benefits of seafood consumption must be weighed against the risks. For most people, following the recommended national dietary guidelines is the best means of balancing risks and benefits. For some groups such as pregnant women and children, specific advisories on healthy and safe seafood choices should apply. For more information, see http://www.nap.edu/catalog.php?record_id=11762