



Water
Research
Australia



Member Update - October 2014

Ebola virus and drinking water

Amid increasing concern about the possibility of Ebola virus reaching Australia, this fact sheet provides some up-to-date information about the virus, what is known about its biology and the risk it poses in water. *The Ebola virus is only known to be transmitted from person to person via body fluids and has never been associated with transmission through water.* The information below was provided by Dr Martha Sinclair, Senior Research Fellow, Department of Epidemiology and Preventive Medicine, Monash University.

Ebola virus and water

Background information

Viruses cannot grow in water or any other environmental niche – they can only grow inside a suitable host cell. In the case of Ebola virus this means a cell within a living human or other mammal.

All viruses contain genetic material (DNA or RNA) surrounded by a protein coat (capsid). Some viruses also have an envelope (membrane-like sac) which encloses the capsid. The envelope is derived from the lipid membrane of the host cell in which the virus grows, and also contains proteins made by the virus.

The first step of the infection process for any virus involves structures on the surface of the virus recognising and binding to the surface of a suitable host cell.

The lipids on the surface of enveloped viruses make them more prone to damage by chemicals (detergents, solvents, oxidising agents) than the protein capsid of non-enveloped viruses. Damage to the envelope very quickly renders the virus unable to infect new cells.

Enveloped viruses are generally regarded as more “fragile” than non-enveloped viruses when they are in the environment, and lose infectivity more rapidly.

Ebola is an enveloped virus.

Viruses in drinking water

The viruses that have been associated with drinking water outbreaks due to absent or inadequate disinfection are all non-enveloped viruses (adenovirus, rotavirus, norovirus, enterovirus, polio virus, hepatitis A and E viruses).

This suggests that enveloped viruses are unlikely to survive

for long in raw water and will be more rapidly inactivated by chlorination than the common enteric viruses.

Chlorine inactivates enveloped and non-enveloped viruses by damaging both the outer surface of the virus and its genetic material.

Chlorine solutions are used to disinfect surfaces and equipment contaminated by Ebola virus but there are no data on the effects of chlorine levels applicable to drinking water treatment.

At the time of the avian influenza outbreak in 2005 the possibility of transmission of this non-enveloped virus via drinking water was examined by the World Health Organization, and it was concluded that the risk was negligible if water was properly disinfected (although no data existed on disinfection at levels relevant for water supplies). Since then some research has been done on the effects of drinking water treatment and disinfection on the influenza virus which has confirmed that it is at least as sensitive to chlorination as the common waterborne enteric viruses.

Therefore, based on current knowledge, water supplies which receive an adequate level of treatment and disinfection to remove the common human enteric viruses are not likely to pose any risk of transmission of the Ebola virus – even if the raw water contains faecal contamination from Ebola cases. *Standard sanitary practices by water industry operations and maintenance workers will minimise any workplace risks.* (Ebola response plans by Australian health departments include disinfection of all faecal waste and body fluids from patients diagnosed with the Ebola virus prior to disposal to the sewer system.)

Reliable and current information is also available from the following sources:

Australian Government Department of Health (Oct '14)
<http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-ebola-info-patients.htm>

Centers for Disease Control and Prevention (Oct '14)
<http://www.cdc.gov/vhf/ebola/index.html>

World Health Organization Fact Sheet - # 103 (Sept '14)
<http://www.who.int/mediacentre/factsheets/fs103/en/>