**Briefing Paper**
June 2017

# Cryptosporidium and cryptosporidiosis


## Summary

- Cryptosporidium is a microscopic parasite that can cause severe and persistent diarrhoea, known as cryptosporidiosis.
- Routes of transmission are most often by direct contact with infected animals or humans. Transmission can also be indirect, for example via recreational waters such as swimming pools or occasionally via food or water.
- The organism has been demonstrated to be transmitted through contaminated drinking water supplies, including private water supplies. Although uncommon in public water supplies, this has the potential to affect large numbers of people and therefore must be avoided through strictly controlled processes.
- There is a general requirement that no organism should be present in sufficient quantities to constitute a threat to public health, rather than a specific requirement for Cryptosporidium.
- Water companies take a multi-barrier approach to water treatment. Control of contamination in the catchment from which water is sourced remains the first barrier in the industry's approach to managing the risks to drinking water from Cryptosporidium.
- Cryptosporidium is resistant to chemical disinfection. Treatment processes, based on UV light to inactivate and filtration to remove Cryptosporidium oocysts can be effective.


## Technical background

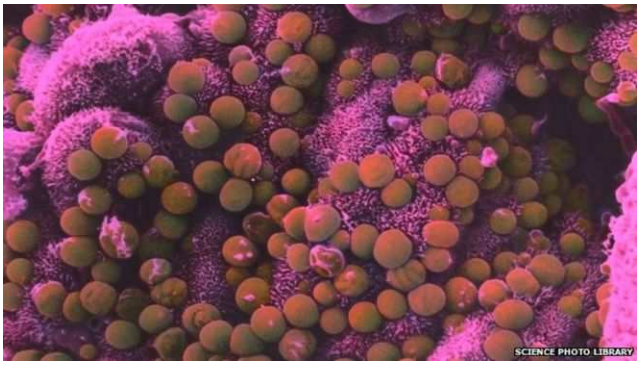
*Where does Cryptosporidium come from?*

Cryptosporidium is a protozoan parasite that causes a diarrhoeal disease known as cryptosporidiosis. The organism is of common worldwide occurrence. Cryptosporidiosis in humans is usually, but not solely caused by the specific species of *C.hominis* and *C. parvum.* People with weak immune systems are likely to be more seriously affected. The most common symptom is mild to severe watery diarrhoea[1].

The organism is released from its host in hardy shells known as oocysts. These are typically 4-5µm in diameter and released in large numbers in the faecal matter of infected hosts. These oocysts are known to be able to survive for long

[1] https://www.gov.uk/government/collections/cryptosporidiosis-guidance-data-and-analysis

periods in the environment in a dormant state and are activated once consumed by a new host.




**Cryptosporidium oocysts** (http://www.bbc.co.uk/news/uk-england-lancashire-3382395)

The most common routes of Cryptosporidium infection are through person-to-person or animal-to-person contact. Infection through recreational waters (e.g. swimming pools), via contact with animals (e.g. petting zoos etc) and via person to person contact at child care facilities (e.g. day care nurseries where personal hygiene is difficult to manage) are also known routes.

While water borne transmission through the public water supply is rare, it has the potential to affect large numbers of people and it is therefore vitally important to ensure that effective barriers are in place.

The number of oocysts required to initiate infection is uncertain but is thought to be of the order of 10-100 and depends on the immunological status of the individual. Therefore, while the presence of low levels of oocysts in drinking water requires attention, it does not necessarily mean that these would automatically lead to cases of cryptosporidiosis in the community.

*What standards apply to Cryptosporidium in drinking water?*
There is no specific standard for Cryptosporidium in the EU Drinking Water Directive[2] or the national regulations[3]. Under section 68 of the Water Industry Act 1991 water suppliers have a statutory duty to supply wholesome water. Drinking water should not contain any micro-organism or parasite at a concentration that would constitute a potential danger to human health.

[2] http://ec.europa.eu/environment/water/water-drink/index_en.html
[3] e.g. www.legislation.gov.uk/uksi/2016/614/contents/made

Techniques for sampling and analysis are complicated and time consuming, requiring the filtration of large volumes of water (100 - 1000 litres), followed by several stages of isolation and concentration of the oocysts from the water sample, and then by identification and enumeration by microscopy.

Initial testing does not provide information on whether the oocysts are viable and therefore capable of causing disease. This requires further analysis. Identification of the species sub-type can be helpful in tracing the source of contamination and the potential for infection.

*What steps are taken to manage the risks?*
In the UK, water companies adopt a formal risk-based approach to assessing and managing Cryptosporidium and any other substance that could constitute a potential danger to human health. Such an approach is widely used by drinking water providers to assess potential sources in the catchment and the risks to drinking water sources.

Addressing the problem at source is the first element of a multiple-barrier approach. Water companies establish operational monitoring strategies to confirm this approach is working efficiently. This is particularly important in surface water catchments, especially those with animal grazing or stocking and to shallow groundwater where contaminated run off can enter the aquifer.

Control measures to prevent animal or human waste from discharging upstream of the abstraction point include fencing water courses to prevent livestock contaminating the raw water and ensuring septic tanks are not leaking into water courses or groundwater.

Where an unacceptable risk remains, appropriate treatment barriers can be put in place. Cryptosporidium oocysts are resistant to normal chlorine disinfection. UV disinfection (where water is passed through high intensity UV light chambers)[4] can be used to inactivate oocysts, while oocyst removal is normally best achieved through other well operated conventional water treatment processes, particularly clarification and filtration and membrane processes.

On the rare occasions where Cryptosporidium is detected, companies immediately investigate the cause and make corrections while consulting with local health protection units to determine measures needed to protect public health.

[4] http://www.dwi.gov.uk/stakeholders/guidance-and-codes-of-practice/uv-irradiation.pdf

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Increased understanding of contamination and the considerable amounts of monitoring data that are now available have helped water suppliers to establish effective means of controlling Cryptosporidium in drinking water. However, there is a need for constant vigilance.