

# CRYPTOSPORIDIUM IN WATER

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## SUMMARY

Concerns have been raised in recent weeks about the presence in the Sydney water supply of the parasite *Cryptosporidium*. This article describes the Water Board's newly developed monitoring program, and discusses overseas experiences.

*Cryptosporidium* is a protozoan parasite which has been recognised as a cause of gastrointestinal illness in humans since 1976<sup>1</sup>. While the most common route of infection is faecal-oral contact, the organism has been implicated in waterborne outbreaks in several other countries, particularly in the USA and the UK<sup>2</sup>.

The Water Board, through its trading arm Australian Water Technologies (AWT), and the Drinking Water Program, has developed a monitoring program to investigate Sydney's water supply system for the presence of this organism. Until recently methods for the detection of this parasite have been very difficult and inaccurate. They involved filtration of very large volumes of water (up to 1000L), concentration of the filtrate with flotation techniques and microscopic examination of pellets using fluorescence microscopy, a very laborious (one person day per sample) and inefficient (~ 0.5 to 5% recovery) procedure. AWT, in collaboration with Macquarie University and Thames Water Utility, has developed a flow cytometry technique which is faster (5 to 10 samples a day), requires much smaller sample volumes (10L), and is considerably more sensitive than the older methods<sup>3</sup>.

The Sydney monitoring program has been designed to identify concentrations of *Cryptosporidium* oocysts throughout the water system, from the reservoirs to consumers' taps. This examination of the whole system will enable the Water Board to develop management strategies to minimise the levels of the organism entering the distribution system.

Results to date (85 samples) have shown that *Cryptosporidium* oocysts are generally present in raw water sources at a concentration of about 0.1-1 oocysts/L. These concentrations are reduced by about 10 times within the distribution system in the unfiltered areas of the supply (94 per cent of Sydney's water), and by about 100 times in the filtered areas<sup>4</sup>.

Overseas data from Great Britain and the USA, and analysis of major waterborne outbreaks of cryptosporidiosis, provide a reasonable basis for judging the potential health significance of *Cryptosporidium* concentrations that may be identified in Sydney's water supplies. Concentrations of oocysts in raw or filtered drinking water from unprotected lowland catchments in England<sup>5</sup> and the eastern USA<sup>6,7</sup>

and unfiltered drinking water from the north-west USA<sup>8,9</sup> are in the same range or exceed those found in Sydney's water supply (Table 1). The data presented in Table 1 are from more than 80 communities ranging in population from 50,000 to 1.5 million resulting from monitoring conducted over up to two years. Monitoring of raw and filtered surface waters in Great Britain indicates that oocyst concentrations in drinking water there are similar to those reported in USA locations<sup>5,9</sup>.

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## EDITORIAL COMMENT

*Cryptosporidium* is a protozoan parasite which has been responsible for at least one outbreak of diarrhoeal illness in NSW<sup>10</sup> and a number of cases overseas.

The improved method for the quantification of *Cryptosporidium* in water supplies is a welcome development and has implications world wide for the improved management of drinking water supplies. Improvements in the detection of the organism will enable a better definition of the link between *Cryptosporidium* in the water supply and illness.

This development is an important part of an overall strategy for the Water Board to reduce the potential for outbreaks of cryptosporidiosis. Reducing the risk of the organism entering water supplies through catchment management and optimal management of the water treatment and supply systems will ensure drinking water is safe. The Department will continue to work with the Water Board to prevent outbreaks of cryptosporidiosis. It will also improve monitoring of the illness and ensure an appropriate response in the event of future episodes of cryptosporidiosis.

TABLE 1

SUMMARY OF CRYPTOSPORIDIUM OOCYST LEVELS FOUND IN RAW SOURCE WATERS AND IN BOTH FILTERED AND UNFILTERED DRINKING WATERS

Water source	Water type	No of samples	Crypto conc Avg, No/L	Crypto conc Min, No/L	Crypto conc Max, No/L	Reference
East USA	Raw	84	280	7	9680	6
West USA	Raw	36	12	2.9	66	8
West USA	Drinking	36	1.7	0.4	7.2	8
East USA	Filtered drinking	82	1.5	0.13	9.6	7
West USA	Filtered drinking	11	0.22	0.12	0.38	9
West USA	Reticulation	5	0.007	0.003	0.02	9
England	Raw	318	0.03	0.04	3	5
Sydney	Raw	85	0.5	<0.001	14.3	4
Sydney	Reticulation	60	0.002	<0.001	0.04	4