



## Re-usable spin concentrator for recovery of *Cryptosporidium spp.* and *Giardia spp.* cysts from potable and environmental waters.

*A prototype device that uses dissolvable filters to collect cysts and prepare them for DNA extraction & PCR detection.*

### Contact

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### Inventors

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### Field

Environmental diagnostics

### Technology

Spin concentrator for processing samples collected on dissolvable filters for collection of *Cryptosporidium* and *Giardia* cysts

### Key Features

- Cysts are easily retrieved from filter by dissolution of filter followed by separation of solvent dissolved material and insoluble debris

### Key Benefits

- Decreases processing time for analysis
- Decreases sample expense

### Stage of Development

Prototype developed

### Status

Seeking licensing partner

### Patent Status

Provisional Patent Application

### Existing US EPA Method 1623

Samples for analysis by Method 1623 can be collected as bulk ten liter (10 L) “grab” samples or field filtered (10 - 50 L samples). The method first requires filtration of a water sample on to a filter medium. For *Cryptosporidium* detection, the material that remains on the filter media is eluted and any oocysts are separated using magnetic beads conjugated to anti-*Cryptosporidium* antibodies. The oocysts are stained with fluorescently labeled monoclonal antibodies, and the sample is then examined microscopically and compared to specified criteria for size, shape, color and morphology.

### Existing filters & elution

Several types of filters have been approved by the EPA, including the EnvirochekT and Envirochek HV filters (Pall Gelman Laboratory, Ann Arbor, MI) and the Filta-Max T and Filta-Max xpress filters (IDEXX Corp., Westbrook, ME).

Elution of captured organisms from the filter media is accomplished by agitation in the presence of elution fluid. This dislodges the particulates from the surface of the membrane filter, allowing them to back-flushed out of the filter and then concentrated by centrifugation.

### Improvements by the present invention

This invention simplifies the retrieval of cysts and their preparation for analysis. This device is durable and reusable. It isolates *Cryptosporidium* and *Giardia spp.* cysts by filtration of water samples onto replaceable 25mm, 47mm, or 142mm mixed cellulose ester (MCE) filters. The filters are readily available and range in price from 0.50 to \$6 each. (By comparison, Filta-Max filters are \$63 each and Envirochek filters are \$100 each.

By using a dissolvable filter in the spin unit, the cysts can be quickly, easily, and more reliably retrieved from the filter while removing extraneous debris and substances potentially inhibitory to PCR reactions. The cysts can then be analyzed by PCR-based methods for more rapid and accurate species determination than microscopic methods.

### Minimal detectable levels of *Cryptosporidium*

The prototype device and method has been used in conjunction with the PowerSoil® gDNA extraction kit and real-time PCR hybridization probes to detect (3 positives in 3 trials) of 100 cysts/oocysts spiked in 1L of environmental water (turbidity ~ 8.5 NTUs). In tap-water (turbidity ~ 1.5 NTUs), it has detected (2 positives out of 3 trials ) 100 cysts/oocysts spiked into 10 L. (Note: detection levels are still the subject of optimization trials.)

### Opportunity

University of West Florida is looking for commercial licensing partners for this patent.