

PROJECT BRIEF

A GIS approach to waterborne infectious disease: Cryptosporidium

Background

Cryptosporidium is a parasite that causes a severe and occasionally fatal diarrhea in humans. It is persistent in the environment because it forms an inert particle (oocyst) that does not become active until it is ingested, at which time it matures into the invasive organism. These oocysts are typically found in water sources (streams and rivers) and represent a continual threat to the urban population. The 1993 outbreak in Milwaukee was clear evidence of this threat, which resulted in 400,000 cases of illness and over a hundred deaths.

Purpose

Geographical Information Systems (GIS), a data mapping system, was used to map the presence of pathogens and environmental data for both the Milwaukee and Menomonee Rivers. This technique will assist in analyzing the movement of Cryptosporidium through an environmental system and the associated risk assessment that differs markedly from analysis of other communicable diseases.

Goals

- Use GIS to describe the location and viability of persistent oocysts of the human pathogen, Cryptosporidium.
- Provide a model and map that will be a unique description of a reservoir of human disease and can be related to risk assessment.
- Fuse two different technologies – biotechnology and GIS to create a new tool that gives a unique view of an important human pathogen in its natural environment.
- Enable water utility managers to respond with appropriate barrier

controls necessary to maintain safe drinking water supplies.

Timeline

May 21, 2007 – December 31, 2009

Progress to Date

- Bacterial indicator performed on Milwaukee and Menomonee Rivers to establish the pattern of contamination.
- Sampling areas have expanded to include smaller branches of each river.

Preliminary Findings

Results indicate that in the Milwaukee River, rural water is cleaner than urban water, and the Milwaukee River is cleaner than the Menomonee River (e.g., lower enterococcus concentration).

Funding Source

Center for Urban Population Health's Center Scientist Development Program through the Wisconsin Partnership Fund

Partner Institutions

University of Wisconsin – Milwaukee

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Sciences

Changshan Wu, Ph.D., Geography

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Accomplishments to Date

Burlage, R.S. (2009). Safe Food and Water.
UWM Board of Directors Meeting (May
28).

Burlage, R.S. (2009). Food and Water
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Burlage, R.S. (2008). Cryptosporidium and
our water. *On Public Health Series, UW-
Milwaukee* (December).

Cogswell, A. & Burlage, R. (2007).
Transcriptional Regulation of an Early
Gene in *Cryptosporidium Parvum*
Oocysts. 47th Interscience Conference
on Antimicrobial Agents and
Chemotherapy. Chicago, IL.

Provisional Patent. Measuring Viability in
Cryptosporidium Oocysts and other
pathogens. R. Burlage and A. Cogswell.
2007. Assigned to UWM Research
Foundation, Inc.

The Center for Urban Population Health is a partnership among the University of Wisconsin School of Medicine and Public Health, the University of Wisconsin-Milwaukee, and Aurora Health Care, Inc. Our mission is advancing population health research and education to improve the health of urban communities.