Detection of *Toxoplasma gondii* and surrogate microspheres in water

A new tool for investigating a waterborne zoonosis

Results removed due to pending publication

*Presentation in full will become available after publication*

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Background: Waterborne Disease

- A leading cause of death world-wide
  - Developing nations
  - 3.4 Million deaths annually
  - 1.8 Million children

- Ingestion of pathogens in contaminated water
  - Viruses
  - Bacteria
  - Parasites
Introduction: Toxo

- *Toxoplasma gondii (Toxo)*
  - Zoonotic protozoan parasite
  - Infects humans and animals
  - Agent of toxoplasmosis
  - Global distribution

*Toxo oocyst*
Introduction

- *Toxo* – Life cycle
  - Cats definitive hosts
  - Many warm blooded animals as intermediate hosts
- Transmission routes
  - Oocyst ingestion
  - Undercooked meat
  - Congenital
Toxo in People

- Infection subclinical in 90% of healthy adults
- Life long infection
- Human exposure
  - US: 20%
  - Israel: 40-75%
  - France: 70%
  - Brazil: >90%
Human Toxoplasmosis

- Healthy adults – 10%
- Fatal disease in Immunocompromised
- Children of women infected during pregnancy
  - Myeloencephalitis
  - Birth defects
  - Retardation
  - Pneumonia
  - Blindness
  - Schizophrenia

Healthy adults at risk from waterborne infection
Waterborne Toxoplasmosis Outbreaks

- Canada, 1995
- Panama, 1979
- French Guyana, 1998
- Brazil, 2002
- India, 2004
Waterborne Toxoplasmosis: Oocyst Transmission

- Contamination of waterways with cat feces
  - Sewage
  - Point source: Storm drains
  - Runoff: Non-point source pollution
Waterborne Toxoplasmosis: Oocyst Resistance

- Chemical
- Physical
- Environmental persistence:
  - Survival in soil 18 mo
  - Survival in water 54 mo
Waterborne Toxoplasmosis: Prevention

- Lack of effective chemical disinfectants
- Prevention measures:
  - Identify high risk zones
    - Where do oocysts enter the watershed?
    - Where do oocysts accumulate?
  - Remove Toxo oocysts
    - Filtration
    - Coagulation
    - Wetlands

Classic transport and fate questions… BUT HOW?
Does urbanization lead to increased contamination of waterways with Toxo?

- Increased domestic cat population
- Increased impervious surfaces
- Storm drains
- Reduction of natural wetland habitats
Thank You

Funding: NIH EID

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Veterinary Medicine:
Patricia Conrad, Heather Fritz, Jonna Mazet, Ann Melli

Environmental Engineering:
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