

# Micro-organisms and Swimming Pools

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April 2007

# Pathogenic Micro-organisms

- Pathogenic means “disease causing”
- Pool pathogens come from different type of micro-organisms
  - Viruses
  - Bacteria
  - Fungi
  - Amoebae
  - Parasites

## What do these micro-organisms cause?

- Skin & outer ear infections
- Throat & eye infections
- Gastroenteritis
- Hepatitis A
- Pneumonia
- Meningitis

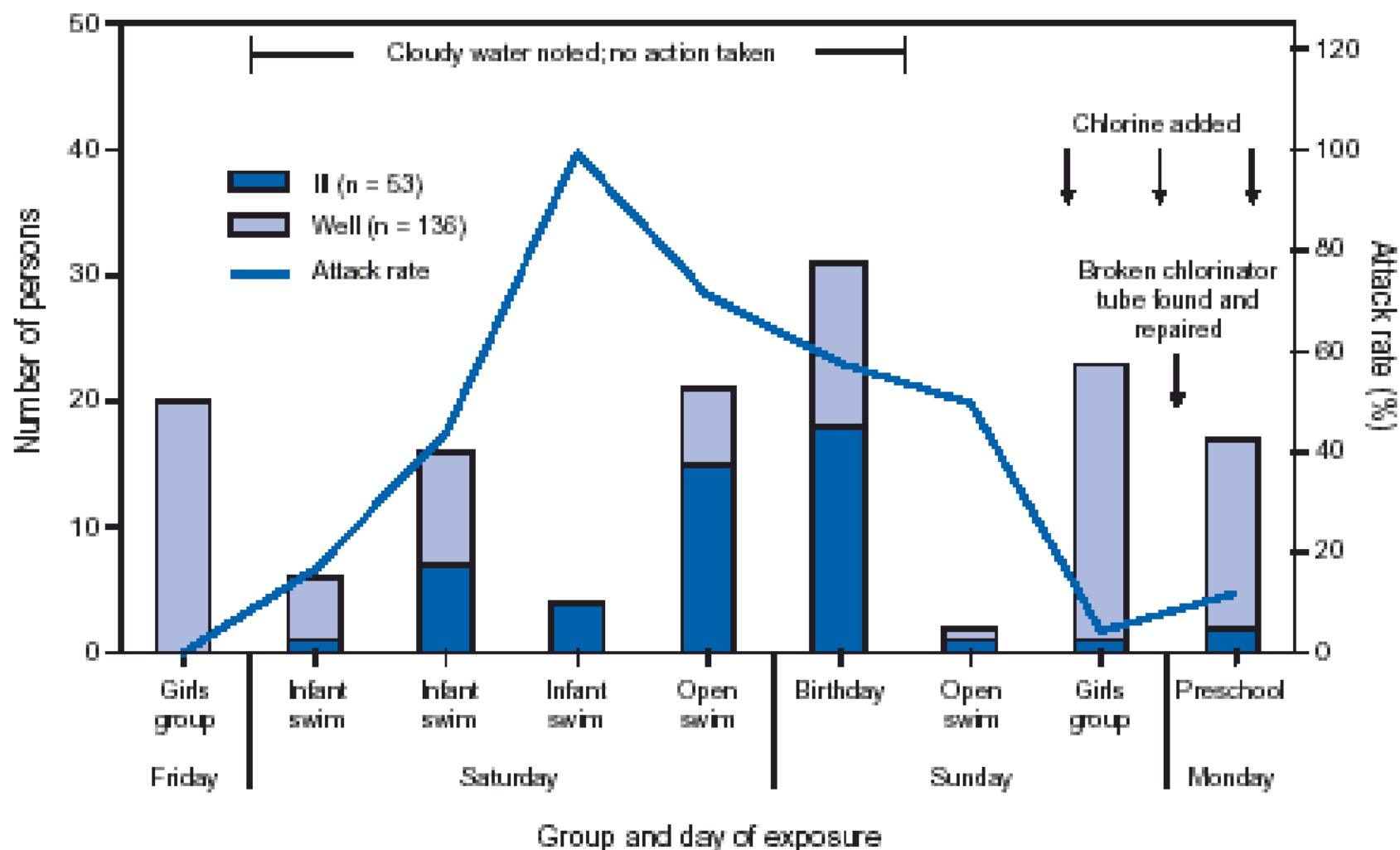
## Where do the micro-organisms come from?

- The water supply
- Human skin (and from walking on surfaces)
- Discharges from the nose, throat and eyes
- Vomit
- Faeces (human, animal and birds)
- Showers, floors, mats, towels and change rooms
- Wind blown debris and litter

## How do we catch them?

- Skin contact
- Cuts & abrasions
- Ingestion
- Nose & conjunctival contact
- Puncture wound
- Inhalation

FIGURE. Number of well and ill persons and attack rates of acute gastroenteritis, by exposure group and day — Vermont, January 30–February 2, 2004



## Some pathogenic viruses

- Enterovirus (related to polio)
  - Gastroenteritis
  - Respiratory infections with/without spots
  - Meningitis
- Hepatitis A
- Herpes simplex
  - Cold sores
  - Ulceration of throat & mouth
  - Blistering rash
- Papovavirus (plantar warts)

## Some pathogenic bacteria

- *Pseudomonas aeruginosa*
  - Opportunistic pathogen in hot temperature spa pools
  - Severe skin and ear infections
- *Staphylococcus aureus*
  - Shed from skin or nose; carriers
  - Boils and wound infections
- *Mycobacterium marinum*
  - Swimming pool granuloma
- *E. coli* 0157
  - Faecal contamination
  - May cause bloody diarrhoea, life threatening HUS

## Another pathogenic bacteria - *Legionella*

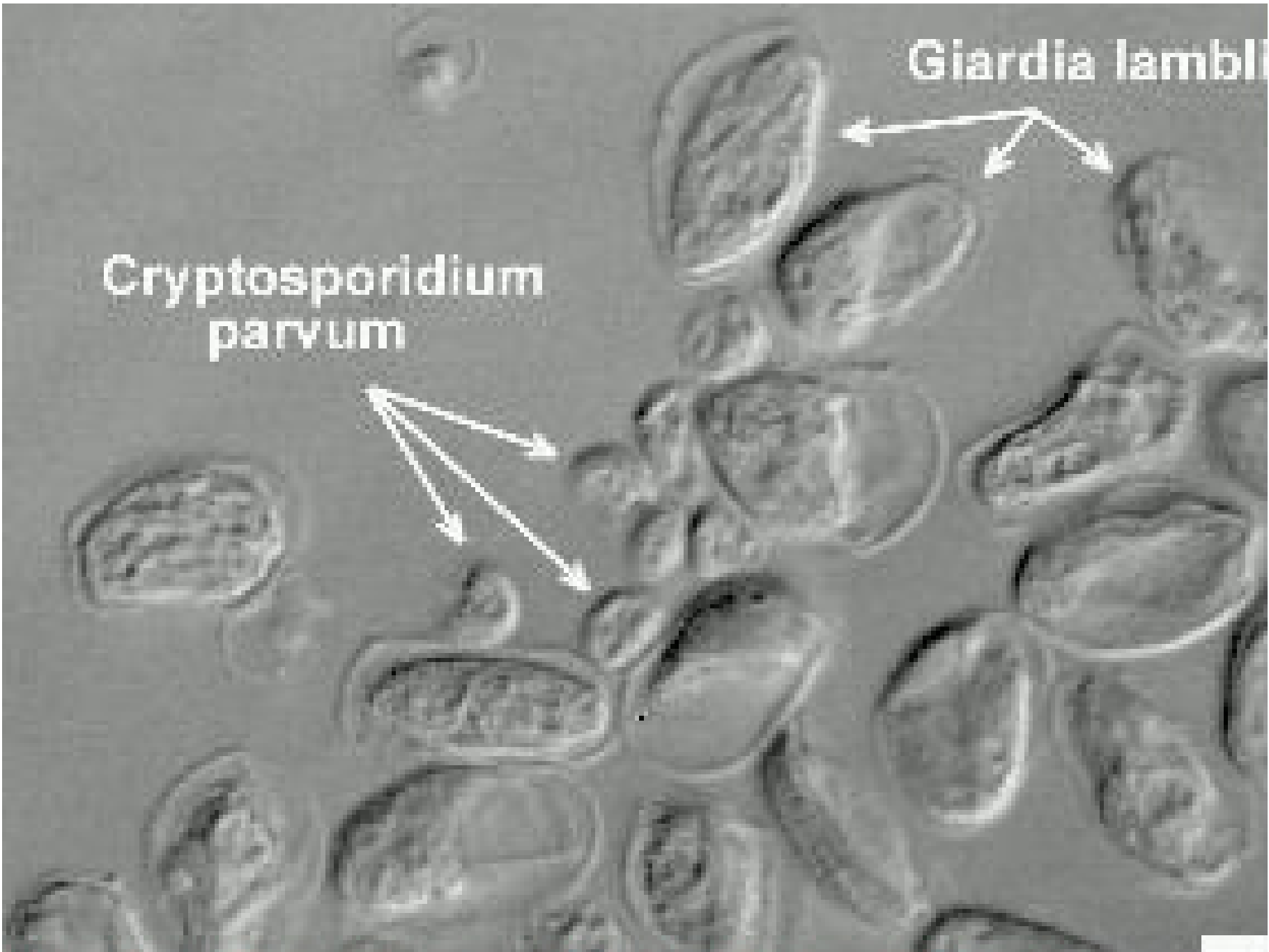
- **Wisconsin, January 1998**
  - Ill people exposed to whirlpool spa and swimming pool
  - Headache, fever, chills, myalgia, shortness of breath, fatigue
  - Diagnosis of Pontiac fever serologically – *L micdadei*
  - High concentrations of bacteria from spa & swimming pool filter
- **Norway, 2001-2004**
  - investigating 19 sporadic cases Legionnaires' disease
  - *L Pneumophila* in CT, spa, pool, shower, hot water

# “Free-living amoebae”

- ***Naegleria fowleri***
  - freshwater esp. warm climates
  - primary amoebic meningitis
  - enter through respiratory tract (nose)
  - extremely rare
- ***Acanthamoeba spp***
  - live in fresh water
  - can harbour *Legionella spp*
  - infect cornea of eye (contact lens)
  - rare cause of meningoencephalitis

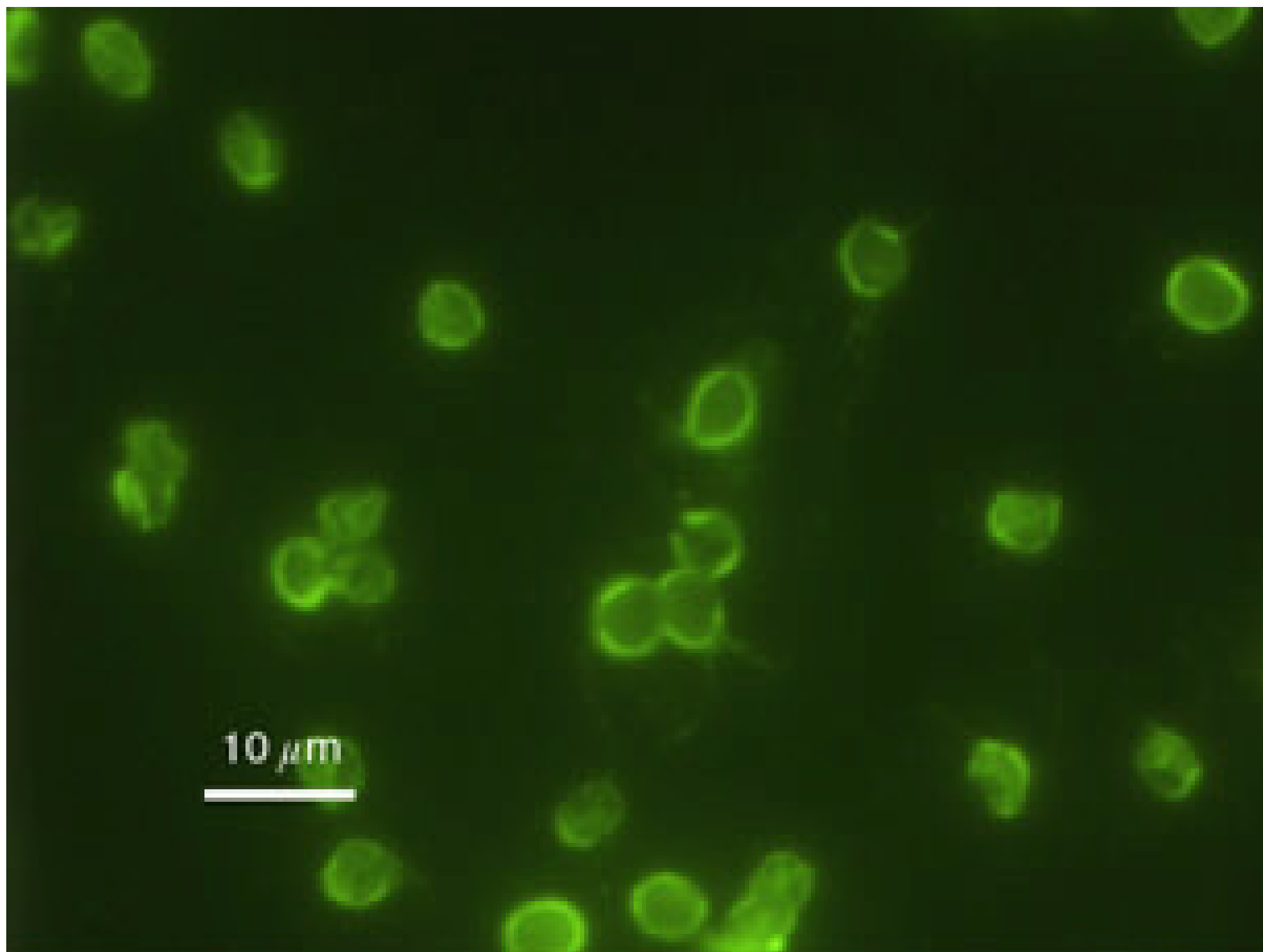
# Cryptosporidium & Giardia

- Parasites - infect humans and animals
- Cysts survive well in environment
- Low infective dose of crypto oocysts needed
- Human faecal contamination most likely cause apart from day care centres
- Self-limiting watery diarrhoea
- May be chronic and life-threatening in AIDS patients
- Difficult to eradicate from swimming pool water



*Cryptosporidium parvum*

*Giardia lamblia*



# Cryptosporidium outbreaks

- Illinois 2006 – recreational water park, 358 cases with diarrhoeal disease
- Japan 2005 – sports centre
- Sweden 2005 – 800 to 1,000 people, duration of illness >4 days for 52%, >10 days 34%
- Canada 2004 – swimming pool
- NSW 2001 – swimming pool associations

## Summary

- **Many organisms can contaminate water, including swimming pools**
- **Pathogenic sources are mostly humans, but can be the natural environment**
- **Prevention**
  - **Risk Assessment and Management**
  - **Pool maintenance**
  - **Personal hygiene**