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Sentinel microbe *Acanthamoeba*: Incubator of antibiotic resistance in polluted water

Molecular studies of resistance genes among intracellular bacteria of *Acanthamoeba*, a free-living sentinel amoeba can highlight the role of water pollutants in the development of antimicrobial resistance within microbial communities, which could help to develop management options to reduce risks of resistance genes transmission to humans and animals.

Competitive advantage

- Cross-disciplinary approach to resolve environmental challenges that impact on human health
- Expertise in molecular biology, antimicrobial resistance, ocular microbiology/microbiome, and microbial ecology
- Laboratories with cutting-edge techniques for antimicrobial assays and genomics
- Advantages include:
 - Novel models to demonstrate how microbial resistance genes evolve, transfer, mobilise, and disseminate via the symbiosis process in *Acanthamoeba* species
 - Controlling amoeba in the environment may mitigate a hotspot of resistance evolution
 - Highlighting the role of water contaminants (toxic elements) on microbial communities which could drive antimicrobial resistance

Impact

- Build-up of water pollutants will drive development of resistance to these within microbial communities. This resistance is often mediated by genes on mobile genetic elements that also contain genes for antibiotic resistance.
- Bacteria may use their ability to survive within amoeba as an additional mechanism to escape from the build-up of toxins.
- Bacteria within amoeba can also transfer resistance genes between themselves
- Dissemination of amoeba through water can disseminate resistant microbes
- Transmission of many microbes that can infect humans commonly occurs via water
- Development of novel approaches to prevent the emergence of *Acanthamoeba* harbouring drug resistant intracellular pathogens.

Successful outcomes

- Reducing numbers of the role of water contaminants on microbial interactions which could drive antibiotic resistance to turn back a foundation of modern medicine

More Information

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- Track-record on Acanthamoeba research focusing its impact on eye health, and Acanthamoeba keratitis (AK) prevention understanding symbionts and amoeba interactions

Capabilities and facilities

- Capabilities relating to overall research capability and/or important facilities
- Well-equipped laboratory facilities to identify the novel drug resistance genes in Acanthamoeba symbionts
- Wider collaboration networks with geochemists, policy experts in UK
- Advanced collaborative research arms
- Team of expertise in Acanthamoeba research and its clinical impact particularly, ocular infection

Our partners

- UK Research and Innovation: Natural Environment Research Council
- J&J, Alcon, CooperVision, B&L
- Australian Standards and International Standards Organisation, Contact Lens Working Group