



Rigorous, Relevant Research

Communicable diseases

► Introduction

Infectious diseases remain a significant threat to health, particularly in developing countries and in the ageing populations of the Western world. Many of these diseases can be treated or controlled using chemotherapeutic agents such as antibiotics or anti-viral agents. However, some micro-organisms have developed resistance to multiple drugs and there is a significant challenge to develop new agents and practices to prevent the development of disease and transmission of infection. Research at Aston University aims to improve understanding of how the body responds to infection in health and disease; to develop novel approaches for early, sensitive and specific diagnosis; to design and deliver novel agents to control and treat infectious diseases; to evaluate the efficacy of anti-infectives in vivo; to improve clinical practitioner understanding to support the appropriate and effective use of anti-infectives within the healthcare environment.

The approaches adopted by our interdisciplinary team of clinical microbiologists, cell biologists, medicinal chemists, pharmaceuticalists and pharmacy practitioners include:

- cell and molecular biology;
- molecular modeling and drug design;
- clinical trials;
- drug delivery and formulation;
- medicines management.

► Sponsors and funders

EPSRC, BBSRC, BHF, AWM, EU, the NHS and the pharmaceutical industry.

International academic and industrial collaborations are an important aspect of the group's activities and fruitful ongoing collaborations exist with Baxter Healthcare Corporation, Becton Dickinson and Mediflex in the US.

► Key projects

- Mechanisms of microbial pathogenicity of hospital-acquired infectious agents e.g. *Staphylococcus aureus*, MRSA, coagulase negative staphylococci, *Clostridium difficile* and food pathogens *Salmonella*, *Campylobacter* and *Escherichia coli* O157;
- Innate immune interactions and cellular responses to pathogens, with particular focus on the macrophage and epithelial cell responses in the lung and gut;

- Diagnostics for infectious diseases including fluorescently imprinted polymers, molecular typing and epidemiology;
- Antibiotics, mechanisms of action, microbial drug resistance, design, synthesis, delivery, screening and toxicological testing of libraries of new antibacterial compounds;
- The design, formulation, testing and mechanisms involved in the delivery of drugs, vaccines and gene therapies using liposomes, niosomes, colloid science and other novel particulate systems;
- Policy and systems in health care organisations for the control and appropriate usage of antimicrobial agents and evaluation of their application and effectiveness at a patient level.

► Key significant findings

1. Showed an association between bacteria and back pain which is underpinning major clinical trial for antibiotic usage to treat sciatica. *The Lancet* 2001, 357; 2024-2025.
2. Identified a novel target for anti-inflammatory drugs. *Journal of Immunology* 2003, 171; 2057-2065.
3. Demonstrated the antibiotic resistance profile of the lung pathogen, *Pseudomonas aeruginosa*. *Journal of Antimicrobial Chemotherapy* 2002, 49; 631-639.
4. Developed a novel humane test system for testing gut drug absorption. *International Journal of Pharmaceutics* 2002; 238: 123-132.
5. Prepared novel powder formulations for drug inhalation. *The Journal of Gene Medicine* 2002, 4; 428-437.

► Examples of recent publications can be viewed in the following journals

- *Infection and Immunity* 2008, 76; 317-323.
- *Bioorganic Medicinal Chemistry Letters* 2007, 18; 1708-1711.
- *Journal of Infection* 2007, 55; 220-225.
- *Journal of Controlled Release* 2007, 119; 102-110.
- *European Journal Pharmaceutics and Biopharmaceutics* 2008, 68; 224-234.

Key contacts

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