Antibiotics and Antibiotic Resistance in the Environment: Ecological Fate and Effects, Resistance Development and Implications for Human Health

Jason Snape, Joakim Larsson, William Gaze, Kristian Brandt

May 9, 8:35 - 10:15, Meeting Studio 314 & 316

This session will focus on the fate, behaviour and ecotoxicological effects of antibiotics, co-selective agents, antibiotic resistance (AR) development and transfer in the environment and its implications for human health. Specifically, we use the term antibiotic to include pharmaceutical agents with antibacterial properties. The scope of the session also extends to other chemical agents that can co-select for antibiotic resistance (e.g. metals and biocides). Topics will be grouped in the following four areas: 1) The ecological effects of human and veterinary antibiotics including impacts on natural microbial community structure and function, aquatic food chains and other organisms. 2) The role of antibiotic residues in the environment on the selection and persistence of antibiotic resistant microorganisms and/or AR genes. 3) The dissemination and routes of transmission of AR to humans and implications for human health risk assessment. 4) The fate of antibiotics and AR in wastewater treatment and the environment; including monitoring programmes, and removal and risk management strategies. We would anticipate abstracts that address aspects related to the following questions: Do human and veterinary antibiotics at environmentally relevant concentrations cause adverse effects on aquatic and terrestrial organisms or impact/ support ecosystem services provided by microbial communities? Are particular environments and/or mixtures of antibiotics, metals, and pollutants of special concern? Do human and veterinary antibiotics at environmentally relevant concentrations select for resistant microorganisms or mobile genetic elements carrying AR. What are the pathways of transfer of antibiotic resistant microorganisms and/or AR genes to the human population? What are the environmental conditions that promote the transfer of AR? Are there threshold concentrations of antibiotic agents that promote AR transfer? To what extent does the rate of resistance selection, gene acquisition and dissemination of resistant microorganisms increase with increased exposure to antibiotics or mixtures of antibiotics? What is the frequency and rate of transfer of AR genes between environmental and pathogenic bacteria and can an appropriate risk assessment framework be developed? Does waste water treatment enrich for AR and what wastewater treatment strategies and other management options could be used to reduce the resistance load in the environment? When new antimicrobial drugs are brought to market should an environmental assessment be conducted to identify the pre-existing environmental resistance reservoir? Should pharmacovigilance studies to assess the proliferation of resistance in clinically important pathogens be extended to include environmental compartments?