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Chemical biology directed to anti-infective drug discovery

Our efforts to generate novel antibacterial and antiviral lead substances through chemical biology methods will be highlighted through two projects. Infections caused by pathogenic bacteria represent a major health threat that is expected to rise further in the future. The need for novel antibiotics is currently not met by R&D efforts, in particular in the area of infections caused by Gram-negative bacteria. A main scientific hurdle is the lack of understanding how to assure a sufficient translocation of bioactive molecules across the Gram-negative cell wall. In the talk, our efforts to induce an active transport of small molecules into Gram negative bacteria and methods to quantify such uptake will be presented. We report a series of theranostics agents based on DOTAM derivatives comprising siderophores that actively target bacteria, inhibit bacterial growth and demonstrate efficacy to visualize bacterial infections in mice by optical imaging *in vivo*. In addition, two orthogonal approaches to quantify the intracellular accumulation of such conjugates will be presented. In the second part of the talk, two antiviral natural products with broad-spectrum action against multiple human pathogenic viruses will be presented. Broad spectrum antiviral agents have the potential to improve health-care of infected individuals including patients infected with emerging viruses against which no directly acting antiviral drug is yet available, patients co-infected with two or more viruses and patients infected with viruses that have developed resistance to standard antiviral treatment. Both lead compounds interfere with extra and intracellular lipid metabolism pathways utilized by different viruses.

Biography

Mark Bronstrup has studied chemistry and obtained his PhD from the TU Berlin in 1999. He has joined Aventis in 2000 and spent a research sabbatical with S. P. Gygi at Harvard Medical School in 2003. Between 2005 and 2010, he was leading the Natural Products Science section at Sanofi Aventis in Frankfurt. Between 2010 and 2013, he was managing sections dealing with biomarkers, bioimaging & biological assays. Since December 2013, he has been Head of the Chemical Biology Department at the Helmholtz Centre for Infection Research in Braunschweig and W3 Professor at the University of Hannover. His research is focused on the discovery, characterization and optimization of novel anti-infective drugs.

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