A pair of bacterial siderophores releases and traps an intercellular signal molecule: An unusual case of natural nitrone bioconjugation.

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Abstract

Bacteria employ diverse molecules with specific functions in microbial interactions, such as sensing the environment, communication with other microbes or hosts, and conferring virulence. Insights into the molecular basis of bacterial communication are thus of high relevance for ecology and medicine. Targeted gene activation and in vitro studies revealed that the cell-to-cell signaling molecule and disease mediator IQS (aeruginaldehyde) of the human pathogen Pseudomonas aeruginosa and related bacteria is derived from the siderophore (iron transporter) pyochelin. Addition of IQS to bacterial cultures (Burkholderia thailandensis) showed that the signaling molecule is captured by a congener of another siderophore family, malleobactin, to form an unprecedented nitrone conjugate (malleonitrone) that is active against the IQS-producer. MALDI imaging helped visualizing malleonitrone formation in a real microbial interaction. This study uncovers complex communication processes involving derailed siderophore functions, a novel nitrone bioconjugation, and a new type of antibiotic against Gram-negative bacteria.

Involved units

Biomolecular Chemistry Christian Hertweck Read more

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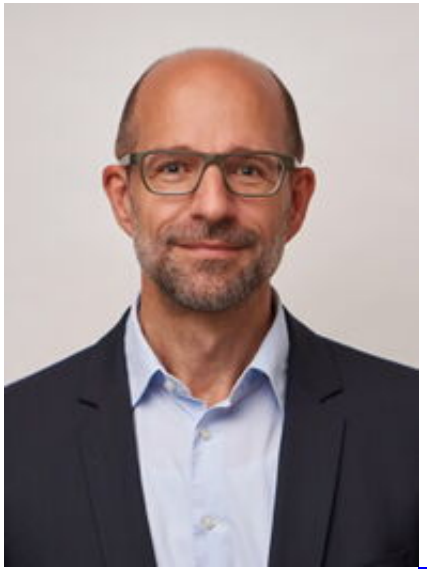

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