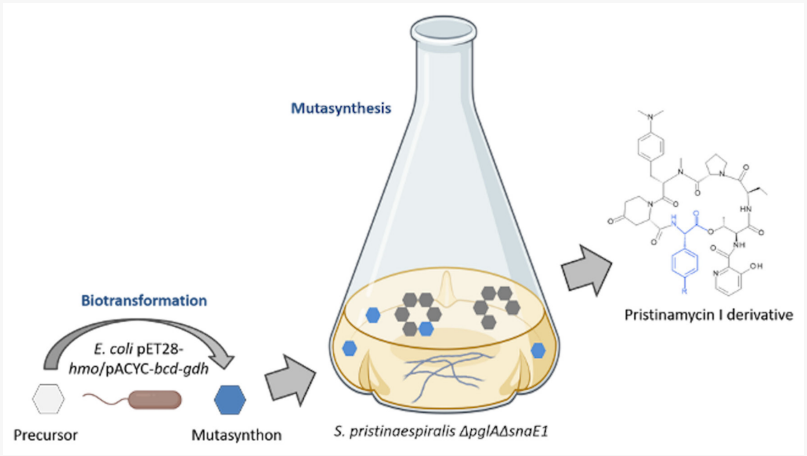
German scientists report success in antibiotic research

German Researcher at the DSMZ in Braunschweig develops new method for the derivatization of antibiotics



Schematic representation of the biotransformation-coupled mutasynthesis approach. Amino acid precursor (white hexagons), mutasynthon (blue hexagons), pristinamycin I products (gray hexagons). Source: DSMZ/Mast

Scientist Prof. Dr. Yvonne Mast Source: DSMZ

BRAUNSCHWEIG, GERMANY, January 15, 2024 /EINPresswire.com/ -- Professor Dr Yvonne Mast, Head of the Department of Bioresources for Bioeconomy and Health Research, and her working group at the Leibniz Institute DSMZ-German Collection of Microorganisms and Cell Cultures have developed a new method for the derivatization of antibiotics. Antibiotics are medicinally important compounds often produced by microorganisms. Such natural substances often have a chemically complex structure and hence can be difficult or even impossible to chemically synthesize or modify by means of semi-synthesis. However, adapting these substances is often necessary to improve efficacy or, as in the case of antibiotics, to confer resistance-breaking properties. Mutasynthesis offers an alternative to the chemical modification or 'derivatization' of substances. This approach generates mutants of antibiotic-producing microorganisms, wherein the genes for the antibiotic precursor(s) are inactivated, so that the microorganism can no longer produce them. By "feeding" mutants with modified pre-products (the precursor derivates), these are then incorporated into the antibiotic precursor molecule, thus resulting in the production of new

antibiotic derivatives.

Bioresources for Bioeconomy and Health Department, Leibniz Institute DSMZ, Braunschweig/Germany

Mutasynthesis: an approach to modify antibiotics

In a study recently published in an internationally renowned journal, Prof Mast's working group describes a new mutasynthesis approach to derivatization of the antibiotic pristinamycin I. Pristinamycin is a streptogramin antibiotic used as an emergency drug against resistant pathogens. "We modified pristinamycin I based on the amino acid precursor phenylglycine by mutasynthesis", explains antibiotics researcher Yvonne Mast. "This was only possible because we had previously identified and functionally characterized the phenylglycine biosynthesis genes, allowing us to generate two new halogenated bioactive pristinamycin I derivatives in our current study. The novelty of this study lies in the fact that we coupled a biotransformation process to mutasynthesis, in which the phenylglycine derivative precursor is provided by a genetically modified bacterial strain (E. coli strain). So far, this is the only biotechnological process of its kind, which we have named 'mutasynthesis 2.0'", summarizes Prof Mast.

Publication:

Hennrich O, Weinmann L, Kulik A, Harms K, Klahn P, Youn J-W, Surup F, Mast Y (2023) Biotransformation-coupled mutasynthesis for the generation of novel pristinamycin derivatives by engineering the phenylglycine residue. RSC Chem Biol. 4:1050-1063.
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About the Leibniz Institute DSMZ

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DSMZ was the first registered collection in Europe (Regulation (EU) No. 511/2014) and is certified according to the quality standard ISO 9001:2015. As a patent depository, it offers the only possibility in Germany to deposit biological material in accordance with the requirements of the Budapest Treaty. In addition to scientific services, research is the second pillar of the DSMZ. The institute, located on the Science Campus Braunschweig-Süd, accommodates more than 85,000 cultures and biomaterials and has around 220 employees. www.dsmz.de

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