PURDUE INNOVATES | Office of Technology Commercialization

Antibiotic Discovery via BICyCLE (Biologically Inspired Chemically Created Leads)

Highly potent, water-soluble Platinum(II) complexes offer a next-generation intramuscular antidote for cyanide poisoning with enhanced scavenging capacity and no acute cardiotoxicity.

Researchers at Purdue University have developed a new drug discovery platform, Biologically Inspired Chemically Created Leads (BICyCLE) and have proven it through the discovery and validation of antibacterial cyclic peptides. New antibiotics are needed because bacteria responsible for serious infections continue to develop resistance to current treatments. Sixty-four percent of FDA-approved small molecule drugs are based on natural products, yet natural product discovery remains challenging. The biology of source organisms is often not amenable to scientific inquiry. A class of natural products of interest in pharmaceutical development are nonribosomal peptides (NRPs), cyclic molecules that are often bulky and structurally rigid, allowing them to favorably target permeable cell walls and resist proteases. Purdue researchers used genetic information to predict previously undiscovered NRPs. Through prediction and bioinformatic analysis, the researchers identified 131 unique cyclic peptides. Of those, 52 diverse peptides were amenable to synthesis. Fourteen of the synthesized compounds exhibited promising antibacterial activity in vitro, some with activity against multidrug-resistant Gram-negative bacteria.

Technology Validation: The new BICyCLE technique was used to establish 14 promising candidates for use in developing new antibiotics to treat multi-drug resistant bacteria, synthesizing the NPs in over 90% purity.

Advantages:

-High Throughput

-Rapid Discovery of Bioactive Natural Products for Drug Discovery

Potential Applications:

-Antibiotics Development

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Category
Biotechnology & Life Sciences/Biomarker Discovery & Diagnostics
Biotechnology & Life Sciences/Bioinformatics & Computational Biology
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation
Pharmaceuticals/Research Tools & Assays

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