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Aryl Isonitriles as A New Class of Antimicrobial Compounds

Novel aryl isonitrile compounds demonstrate potent antimicrobial efficacy against highly resistant bacterial strains, such as MRSA and VRSA, with low toxicity, offering a potential alternative to current antibiotics.

Antibiotics and infectious disease therapy made huge strides in the last century; however, the emergence of resistant strains and superbugs has increased. In the United States alone, 2 million people each year are affected by these infections, resulting in over 23,000 fatalities. Out of these, nearly half are caused by the pathogen methicillin-resistant Staphylococcus aureus (MRSA). Methicillin- and vancomycin-resistant Staphylococcus aureus (MRSA and VRSA) cause a range of diseases including superficial skin infections, pneumonia, osteomyelitis, and bloodstream infections. These strains have become resistant to nearly every class of antibiotics, including agents of last resort, such as vancomycin and linezolid.

Researchers at Purdue University have identified a novel class of compounds that have an aryl isonitrile moiety that shows potent inhibitory activity against clinically important strains of MRSA and VRSA, Bacillus anthracis, and Listeria monocytogenes. These compounds demonstrate strong antimicrobial activity against MRSA strains that are resistant to numerous antibiotic classes such as penicillins, aminoglycosides, macrolides, lincosamides, tetracyclines, and fluoroquinolones. Not only are these compounds potent, they do not show any apparent toxicity against mammalian cells up to a concentration of 64 micrometers, compared to other antibiotics that have a narrow therapeutic to toxic concentration range. In addition, analysis implies that cross-resistance between other antibiotics and these aryl isonitrile compounds is unlikely. Hence, these compounds have the potential for use as future alternatives to other antibiotics for the treatment of resistant strains of MRSA and VRSA in clinical settings.

Advantages:

-Potent antimicrobial activity

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Category

Pharmaceuticals/Small Molecule Therapeutics

Pharmaceuticals/Research Tools & Assays

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-Minimal toxicity at high concentrations

-Effective against resistant strains

Potential Applications:

-Pharmaceutical industry

-Drug R&D

-Alternative antimicrobial therapy

-Treatment of antibiotic-resistant strains

Related Publications:

Davis, Dexter C., et al. Discovery and Characterization of Aryl Isonitriles as a New Class of Compounds Versus Methicillin- and

Vancomycin-Resistant Staphylococcus aureus. European Journal of Medicinal Chemistry. 2015, 101, pp 384-390.

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Intellectual Property:

Provisional-Patent, 2015-04-04, United States | Utility Patent, 2016-04-04, United States | CIP-Patent, 2017-03-13, United States | DIV-Patent, 2019-06-18, United States | CON-Patent, 2019-07-15, United States | Provisional-Patent, N/A, United States

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