

MOLECULAR BIOLOGY, NUCLEIC ACIDS & MOLECULAR MEDICINE

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Engineering a new class of antibiotic against an RNA target

Constantly evolving drug-resistant and multidrug-resistant (MDR) Gram-positive pathogens such as *Staphylococcus aureus* (methicillin-resistant, MRSA), *Streptococcus pneumoniae* and *Clostridium difficile* represent an ever-increasing source of morbidity and mortality in the USA. A new class of topically applied antibiotics against MRSA and other dangerous multi-drug resistant pathogenic infections such as staphylococci and streptococci has been developed. Some bacteria are even developing resistance to vancomycin, an antibiotic drug of last resort. To address these demands, we have selected, screened and characterized a novel putative antibiotic that has little-to-no toxicity, and to which bacteria are slow to develop resistance. This new class of antibiotic targets a ribonucleic acid (RNA) in the cell, rather than a protein. The RNA target is unique to Gram-positive bacteria and is not found in humans, and it is important to basic functions required for the bacteria to live. Our small molecule antibiotic drug turns OFF the RNA function, simultaneously halting expression of as many as 24 genes critical in bacteria, killing the pathogens. Preliminary studies indicate that the new antibiotic is effective against bacteria that had been isolated from humans, is not toxic to human cells in lab cultures at doses effective against bacteria, and is not toxic in preliminary topical animal studies.

Biography

Paul F. Agris created and is the founding Director of The RNA Institute, SUNY at Albany. He is known as a Structural Biochemist and innovator in RNA biology, RNA modification science and applications, and nucleic acid design with modified nucleosides. Agris was a Professor and Head of North Carolina State University's Biochemistry Department, and founded and led the RNA Society of North Carolina for more than a decade. Previously, he was an Assistant, Associate and full Professor in the Division of Biological Sciences and Department of Medicine at the University of Missouri-Columbia. Agris researches into RNA-based therapeutics against infective disease, drug-resistant HIV and MRSA, have been supported continuously by federal agencies since 1974. He is the author of some 170 peer reviewed articles, a number of reviews, chapters and editor of three volumes. Agris founded the RNA-based drug discovery company SIRGA Advanced Biopharma, Inc., Research Triangle Park, NC.

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