Chemical Additive Could Make Old Antibiotics Viable Against Antibiotic-Resistant Bugs

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(PhysOrg.com) -- A Texas Tech researcher said a recently patented chemical additive could break down the shield of certain types of antibiotic-resistant bacteria.

The solution: A short chain of nucleic acid, called an aptamer, can effectively stop antibiotic-resistant bacteria from breaking down antibiotics, said Robert W. Shaw, associate chairman of the Department of Chemistry and Biochemistry.

His results were published online in a special edition of *Chemical Biology and Drug Design* (Wiley-Blackwell) covering the best presentations of the 2008 International Symposium on Organic Synthesis and Drug Discovery.

Shaw said the discovery could turn back the clock for many existing antibiotics that are losing their effectiveness due to the emergence of antibiotic-resistant bacterial strains.

These beta-lactam antibiotics, such as penicillins, carbapenems and cephalosporins, account for about $30 billion in annual sales in the U.S. and much more worldwide. Therefore, antibiotic-resistant bacteria present a major problem to the medical and pharmaceutical industries.

Aptamers are not new, Shaw said. However, the aptamers Texas Tech

researchers discovered, used in conjunction with antibiotics, are effective in killing bacteria that produce enzymes called metallo-beta-lactamase. These bacterial enzymes allow the bacteria to survive exposure to antibiotics.

The metallo-beta-lactamase enzymes have been the hardest enzymes for researchers to counteract, he said, in part because they can lead to the inactivation of so many antibiotics. But the new aptamers that Shaw and other researchers have created can bind to the enzyme and render it harmless to the chemical structure of antibiotics.

“Bacteria become antibiotic-resistant when they exchange genetic information on how to make these enzymes,” Shaw said. “With overuse and misuse, these antibiotics have become less effective during the past 60 years or so. This happens when a bacterium that has antibiotic resistance survives a dose of antibiotics, then shares genetic information on how to become antibiotic-resistant with other bacteria during reproduction.”

Over time, natural selection makes the antibiotic-resistant bacteria the dominant strain, and different antibiotics must be used to treat infection, he said.

“We’re continuing our work, and we’re doing some pre-clinical trials here,” Shaw said.

Last year, The United States Patent Office issued patent No. 7456274 and titled “Inhibition of Metallo-ß-lactamase” to Shaw and Sung-Kun Kim, an assistant professor in the Department of Chemistry & Biochemistry at Baylor University.

Provided by Texas Tech University