New compound combats drug-resistant bacteria

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(PhysOrg.com) -- Yale scientists using bits of material from the human immune system have developed a compound that can neutralize or kill several varieties of drug-resistant and other dangerous bacteria. Drug-resistant bacteria are an increasing risk to the health of the world's population. The new compound's ability to kill bacteria in the lab also is promising as a new treatment for infectious diseases.

"The compound is effective in concentrations currently used in drugs and hopefully can be used to combat infectious diseases as well as drug-resistant organisms," said Sidney Altman, Sterling Professor of Molecular, Cellular and Developmental Biology, professor of chemistry, Nobel laureate and senior author of the study.

The research is published the week of Sept. 26 in the Proceedings of the National Academy of Sciences.

Altman's lab was attempting to improve upon a new method of suppressing the expression of genes responsible for pathogenesis — i.e., the disease-causing properties — in bacteria. The method involves using pieces of the RNA that attach to the RNA coded for genes within the cell that are responsible for pathogenesis. The resulting complex, after being exposed to an enzyme inside the cells, then turns off the expression of genes responsible for bacterial survival.

Working in cell culture, the Yale scientists found that they could use a new compound based on a peptide from a human T cell facilitates to deliver this RNA inside many varieties of bacterial cells. The new compound not only makes bacterial strains more sensitive to existing drugs but also can kill bacteria by targeting genes crucial to cellular survival. The method is 10 to 100 times more effective in targeting bacteria than existing compounds, the scientists estimate.

"We think this compound will be effective in mice and can go from mice to humans in the future," Altman said.

With Thomas R. Cech, Altman was awarded the Nobel Prize in Chemistry in 1989 for discovery of the catalytic properties of RNA.

Provided by Yale University

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