Licensable Technologies

Design of Chimeric Anti-Microbial Proteins

Applications:

- Therapeutic treatment of human infections
- Protection against crop diseases
- Alternative to traditional antibiotics
- Defense against bio-threat agents

Benefits:

- Low susceptibility to antibiotic resistance
- Highly specific antimicrobial activity prevents damage to beneficial types of bacteria.
- CHAMPS can be delivered at infection site for immediate elimination of infectious pathogens, minimizing damage to host organism.

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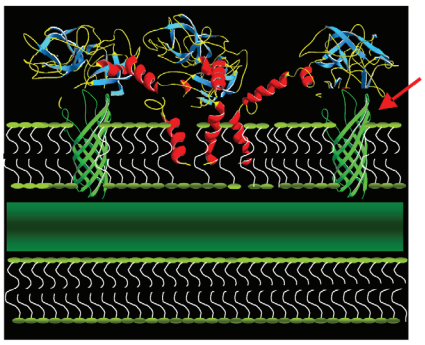
Summary:

When penicillin became widely available during World War II, it was a medical miracle. But just four years after mass production of penicillin by drug companies in 1943, resistant microbes appeared. After more than 50 years of widespread use, many antibiotics are no longer effective. Widespread use of antibiotics is thought to have spurred evolutionary changes in bacteria that allow them to survive powerful drugs.



Schematic of a critical step in the proposed mechanism of the chimeric protein.

The sharp increase in the number of pathogens resistant to one or more antibiotics has become an alarming and challenging trend in the clinical world. The National Academy of Sciences' Institute of Medicine estimates the annual cost of treating antibiotic-resistant infections [in humans] in the U.S. to be $30 billion. According to the Centers for Disease Control, nearly two million U.S. patients acquire an infection during a hospital stay, and about 90,000 die annually as a result of their infection—up from 13,300 patient deaths in 1992. More than 70% of the bacteria that cause hospital-acquired infections are resistant to at least one of the drugs used to treat them. Persons infected with drug-resistant organisms are more likely to have longer hospital stays and require treatment with alternative drugs that may be more expensive, less effective, and possibly more toxic. In short, antimicrobial resistance is driving up health care costs, increasing the severity of disease, and increasing the death rates from certain infections.

In addition to the implications of antibiotic resistance in human infections, resistant agricultural pathogens that cause disease in citrus and grape crops can severely impact the food supply and economy. Antibiotic-resistant bacteria have also been found in meat crops, e.g., resistant *E. coli* in beef products.

Los Alamos National Laboratory (LANL) has developed a method for creating a novel class of highly compatible proteins that can rapidly eliminate bacteria from infected sites in plants and humans. These proteins are effective against both gram-negative and gram-positive bacteria and have very low susceptibility to antibiotic resistance. The proteins called chimeric antimicrobial proteins, or CHAMPS, are formed by combining a surface recognition domain specific for a type of microbe with an antimicrobial protein. The resulting macromolecule is very effective at removing bacteria on contact and is highly specific leaving beneficial bacteria, e.g., those residing in the human gut, intact. CHAMPS have strong commercial potential as clinical therapeutics and as treatment for crop diseases. These antimicrobials also offer a mitigation option for defense biological agents.

Development Stage:

Proof of concept

Patent Status:

Patent pending

Licensing Status:

LANL is looking for a partner to help develop the CHAMPS technology and eventually to assist with commercializing the antimicrobial proteins. The rights to the intellectual property would probably be best developed in specific fields of use, especially as related to human versus plant therapeutics.

www.lanl.gov/partnerships/license/technologies/