

MEDBULLETIN



SUPERBUGS

STAR-SHAPED PEPTIDE POLYMERS KILL SUPERBUGS

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Antibacterial resistance poses an enormous threat to the ability to treat common diseases. It occurs when bacteria develop genetic mutations that render antibiotic drugs ineffective, resulting in prolonged hospital stays and high mortality rates.¹ Multi-drug resistant (MDR) bacteria, also known as superbugs, are urgent threats to global health due to a lack of effective treatment.² Thus, many research labs are tasked with finding novel drugs that can combat MDR bacteria.

A recent study conducted at the University of Melbourne has led to the development of Structurally Nanoengineered Antimicrobial Peptide Polymers (SNAPPs), which exhibit antibacterial properties while being non-toxic to the body.³ The polymers are shown to be highly effective against all tested gram-negative pathogens, including those that demonstrate resistance to other antibiotics. SNAPPs are capable of killing gram-negative bacteria both *in vivo* and *in vitro*.³ Analyses using microscopy and bioassay techniques have shown that the polymer works through multiple pathways, including destruction of bacterial cell membranes, dysregulation of ion movement across cytoplasmic membranes, and induction of cell death.³ The various bactericidal mechanisms of the polymer makes it more difficult for bacteria to develop resistance to it. Furthermore, experiments on red-blood cells show that the dosage needs to be increased 100 times relative to the standard for the substance to be toxic, making it safe for use.

SNAPPs have yet to be incorporated into a commercially viable drug as they have not been tested on humans and currently lack specificity towards certain types of bacteria. However, SNAPPs' pre-clinical success presents new possibilities for targeting MDR bacteria.



ZIKA VIRUS

STUDY FINDS NEW ROUTE OF ZIKA VIRUS TRANSMISSION

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Heavily featured in recent news for its rapid spread through South America, Zika is a mosquito-borne virus with no established vaccine or prevention methods. Although Zika contraction is often characterized by little to no symptoms, pregnant women may pass the virus onto their fetuses, resulting in birth defects such as microcephaly.¹ Previously, it was believed that mosquitoes could only contract the virus by biting an infected host. However, new research shows that female mosquitoes carrying the Zika virus can pass the infection onto their offspring via vertical transmission.¹

The study, published in the *Journal of Tropical Medicine and Hygiene*, elucidated that infected eggs of the *Aedes aegypti* can survive for months on dry surfaces, ensuring the virus' survival in cold or dry conditions even without a vertebrate host. Thus, the Zika virus will persist even if all adult mosquitoes were eliminated because the mosquito's offspring can carry the virus into the next generation. This further complicates current measures to combat Zika transmission.¹ Luckily, not all species of mosquito can transmit the Zika virus through vertical transmission.² It should also be noted that the study observed mosquitoes in a laboratory setting as opposed to the wilderness, which could impact the generalizability of the results.²

The conclusions from the study can be used to improve the current methods for combatting Zika transmission. Recommended interventions include the use of insecticides, the elimination of standing water, and the release of genetically-modified mosquitoes that sterilize the mosquito populace or hinder vertical viral transmission.²

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