EuroSciCon

10th Edition of International Conference on

Advanced Microbiology & Education

June 14-16, 2018
London, UK

Aušra Ražanskienė et al., Arch Clin Microbiol 2018, Volume 9
DOI: 10.4172/1989-8436-C2-008

PLANT EXPRESSED ANTIMICROBIAL PROTEINS AS NEW MEDICINES

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The emergence, persistence and spread of antibiotic-resistant human pathogenic bacteria heralds a growing global health crisis. Drug-resistant strains of gram-negative bacteria, such as *Pseudomonas aeruginosa, Klebsiella pneumoniae* and *Escherichia coli*, are especially dangerous, and the medical and economic burden they impose underscore the critical need for finding new antimicrobials. Plant virus-based expression systems, in which the foreign mRNA is amplified by the replicating virus, can produce very high levels of proteins in leaves and other tissues. Recently, we used this system to produce in plants several colicins and pyocins. The plant-made colicins have received marketing allowance through the US Food and Drug Administration's (FDA) GRAS (Generally Recognized As Safe) regulatory review process. The plant-produced colicin-like molecules from pathogens *Klebsiella* (klebicins) and *Pseudomonas aeruginosa* (pyocins) show high and broad intraspecific activity against multiple pathogenic strains. Pyocins and klebicins also show excellent control of *Pseudomonas* and *Klebsiella* pathovars in animal models. Based on these continuing studies, colicin-like bacteriocins represent a promising class of antibacterials for gram-negative pathogens. Like colicins, bacteriophage lysins are generaly regarded as safe and could be used for treatment of foods and as human and animal therapeutic alternatives to antibiotics. Commercialization of bacteriocins and endolysins as medicines could generate a pipeline of excellent novel alternative to antibiotics. Edible and topical antibacterial proteins that can be made in edible plants and require only a partial purification could be among attractive early product candidates.

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