



Small Wonders: Peptides for Disease Control (ACS Symposium Series)

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The use of antimicrobial peptides (AMPs) as agents in therapeutic and agricultural applications is nearing reality. From the earliest characterization of their antimicrobial activities to novel methods for their synthesis and high-throughput screening assays, this class of antimicrobial agents has been the driving force behind the development of next-generation therapeutics and preventative medicines as well as in the control of plant diseases. More than 1700 natural AMPs from a wide range of life forms ranging from prokaryotes to humans have been characterized to date and many of these have served as templates for the rational design of synthetic peptides with improved potency, specificity, stability, and bioavailability. Once thought to be very uniform in their antimicrobial activity as membrane disruptants, research is now revealing the multifunctional nature of these molecules as critical players not only in the host's innate immunity but also as modulators of the adaptive immune response in mammals or as elicitors of defense responses in plants. Several AMPs not only function solely through interaction and disruption of pathogen cellular membranes but also have the ability to cross the pathogen's cell membrane in a nondestructive manner and interact with intracellular targets interfering with important biological functions and leading to cell death.

AMP technology has tremendous implications for the development of novel therapeutics and plant protective strategies. This book assembles contributions by internationally acclaimed scientists with a focus on therapeutic and agricultural applications. Promising medical applications of peptide technology include treatments for bacterial, fungal and viral infections. Production of more effective peptides, targeting the treatment of cancer, utilizes novel strategies for designing peptide immunogens to elicit specific antibodies. In humans, peptides that modulate the host's adaptive immune response will not be recognized by the invading pathogen as a defense factor and therefore will not be prone to development of resistance by the pathogen. Agricultural applications include control of devastating plant diseases caused by microbial pathogens, some of them resulting in mycotoxin contamination of food and feed products. Though plants and their various pathogens wage a continuous war of resistance against one another, transgenic strategies that utilize AMPs with different modes of action (both extra- and intracellularly) against target pathogens should provide a self defense mechanism that will be much harder for the pathogen to circumvent and develop resistance.

This book is the result of the symposium *Small Wonders: Peptides for Disease Control* held at the 240th National Meeting of the American Chemical Society in Boston, MA, August 22-26, 2010.

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