Mendel Friedman et al., J Bacteriol Parasitol 2014, 5:4
http://dx.doi.org/10.4172/2155-9597.S1.006

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2nd International Congress on
Bacteriology & Infectious Diseases
November 17-19, 2014 DoubleTree by Hilton Hotel Chicago-North Shore, USA

Antimicrobial activities of natural compounds against susceptible and antibiotic-resistant pathogens in the absence and presence of food

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In an effort to improve microbial food safety, we are studying the antimicrobial activities of different classes of natural compounds, including plant essential oils; apple, grape, olive, and tea extracts; bioactive components; and seashell-derived chitosan against multiple foodborne pathogens in culture and in/on food. For example, our studies, and those by other investigators showed that plant essential oils and oil compounds (a) inactivated susceptible strains of *Bacillus cereus, Campylobacter jejuni, Clostridium perfringens, Escherichia coli* O157:H7, *Listeria monocytogenes, Mycobacterium avium paratuberculosis, Mycobacterium tuberculosis, Salmonella enterica, Staphylococcus aureus*, and *Vibrio cholerae* as well as resistant strains of *C. jejuni, E. coli, Mycobacterium luteus, Salmonella Typhi,* and *S. aureus* as well as fungi, viruses, and parasitic protozoa; (b) inhibited bacterial biofilms; and (c) inactivated foodborne pathogens in fruits, fruit juices, vegetables, vegetable juices, wines, and in cereal, dairy, egg, meat, poultry, and seafood products. The results suggest that the most active formulations can be used as broad-spectrum antibiotics to protect food against contamination by pathogenic bacteria. Research needs include determining whether natural, food-compatible antimicrobials can complement or replace medicinal antibiotics against susceptible (nonresistant) and antibiotic-resistant microorganisms used to treat infectious diseases.

Biography

Mendel Friedman obtained a BS degree in Pharmacy at the University of Illinois, Chicago and received MS and PhD degrees in Bio-Organic Chemistry at the University of Chicago. After a post-doctoral year at the Department of Medicinal Chemistry of the University of Wisconsin in Madison, he joined ARS-USDA. His research involves use of natural compounds to reduce foodborne pathogenic bacteria and bacterial toxins. He was Elected Fellow of the American Association for the Advancement of Science. He is Recipient of Spencer Award for Excellence in Research in Agricultural and Food Chemistry and recipient of Award for Distinguished Achievement and Service in Agricultural and Food Chemistry.

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