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Targeting reservoirs to control human infections: A one health approach

Shiga toxin producing *Escherichia coli* (STEC) cause hemorrhagic colitis and potentially fatal extra-intestinal sequelae, such as the hemolytic uremic syndrome and thrombotic thrombocytopenic purpura in humans. Currently, treatment of human STEC disease is only symptomatic and supportive. Antibiotics are contraindicated owing to increased risk of sequelae; hence, diverse new STEC-specific management modalities are being investigated including those that target STEC bacteria, interfere with Shiga toxin (Stx) binding, neutralize Stx, inhibit Stx trafficking, modulate/interfere with host cellular responses to Stx, effect homeostasis of host microbiota (probiotics), and virulence factor-based vaccines. Because ruminants (cattle and sheep) are primary STEC reservoirs, several preharvest control strategies to reduce pathogen load and prevent STEC entry into the food chain are being implemented. These include: Water treatment, dietary strategies, water and feed additives, animal treatments and management and transportation practices. However, these strategies have variable or limited efficacy owing to diverse hosts/environments maintaining STEC on farms, further emphasizing the need for control measures that can be consistently employed. Hence, we are employing host specific studies and pathogen-directed systems-based approaches towards the development of such novel STEC-targeted modalities. These include, elucidating the “interactome” of STEC and the squamous epithelial cells constituting the rectoanal junction (the site of persistence in cattle) and evaluating O157 proteins expressed in the rumen (first compartment of the ruminant stomach). Proteins contributing to cell adherence and rumen survival are being investigated for inclusion in novel anti-adhesion/colonization therapies.

Biography

Indira T Kudva is a Research Microbiologist and Lead Scientist at the National Animal Disease Center, USDA, Ames, Iowa. She has received her BSc in Zoology and MSc in Medical Microbiology degrees from India, PhD in Microbiology, Molecular Biology and Biochemistry from the University of Idaho and trained as a Postdoctoral Fellow at the University of Idaho, Massachusetts General Hospital and Harvard Medical School. She has over 25 years of experience in the field of microbiology, molecular biology and infectious diseases. She has 29 peer-reviewed publications, 3 invited reviews, 27 meeting abstracts, 18 invited talks, 8 funded grants and novel inventions (4 patent applications). She is also an adjunct Assistant Professor at the School of Veterinary Medicine, Iowa State University; the Executive Editor for the “*Virulence Mechanisms of Bacterial Pathogens*” book, 5th Edition, ASM press and is on the Editorial Boards of the *Applied and Environmental Microbiology* (ASM press) and the *SRL Proteomics and Bioinformatics* (SciRes Literature) journals.

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