

Mass spectrometry based investigation reveals plethora of antimicrobial peptides (AMPs) in cow urine with bactericidal effects against *S. aureus* & *E.coli*: A promising substitute to antibiotics

Sudarshan Kumar

ICAR-National Dairy Research Institute, India



Abstract

Urogenital tract (UGT) in animals is vulnerable to pathogenic attack owing to its constant exposure to the outer environment. Normally, such attacks are defended by a complex biochemical microenvironment in UGT which prevents colonization and proximal movement of bacteria. The endogenous peptides are principal agents innately associated with modulation of UGT microenvironment. We investigated the antimicrobial activity in the peptides specifically against *S. aureus* and *E.coli*. The urinary peptide extract showed significant inhibitory effect against pathogenic culture *S. aureus*, *E.coli* and *S. agalactiae*. Approximately, 5000 peptides were identified in the cow urine using high throughput mass spectrometry. The peptide sequences were examined in-silico using web-based platforms CAMPR3, APD and AntiBP2 for possessing antimicrobial activity. Interestingly, ~11% of peptides qualified as strong antimicrobials. One of the peptides clearing set threshold level was synthetically designed and evaluated for its efficacy. The MIC recorded for *S. aureus* and *E.coli* are 161.25 μ M and 80.6 μ M respectively. Using these MIC data kill kinetics experiment was designed to evaluate the effective killing by the peptide sequence. Post treatment, the peptide reduced viable colony count of *E.coli* by 3 log₁₀ at 2X MIC concentration in 8 hours. While viable colony reduction in *S. aureus* at 2X MIC was only reduced by 1 log₁₀



Biography

Sudarshan Kumar is a scientist in Animal Biotechnology Center, ICAR-NDRI. He is engaged in the study of Mammary Gland Proteomics to identify the putative biomarkers for lactational problems. He is specialized in molecular cloning, protein expression, and purification in a wide range of hosts like bacteria, yeast, and mammalian cell lines, which are subjected to Cell culture-based functional characterization.

Publications

- Transcriptional Repression of MFG-E8 Causes Disturbance in the Homeostasis of Cell Cycle Through DOCK/ZP4/STAT Signaling in Buffalo Mammary Epithelial Cells
- DIGE-based identification of preferentially expressed proteins in early stage of lactogenic differentiation in buffalo (*Bubalus bubalis*) mammary epithelial cells
- Past, Present, and Future of Gel-Based Microbial Proteomics
- Comprehensive Profiling of Urinary Peptides in Cow Reveals Physiology Specific Signatures and Several Bioactive Properties
- High-Resolution Mass Spectrometer-Based Ultra-Deep Profile of Milk Whey Proteome in Indian Zebu (Sahiwal) Cattle

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