Monique van Hoek, PhD

Professor, Associate Director of Research, School of Systems Biology
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Education

PhD, Microbiology, University of Virginia

Key Interests

Bacteriology | Gram-negative Bacteria | Antibiotic Resistance | Antimicrobial Peptide | Host Innate Immunology | *Francisella tularensis* | Biothreat Bacteria | Biofilm | Quorum Sensing

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SELECT PUBLICATIONS

- E. M. C. Chung *et al.,* Komodo dragon-inspired synthetic peptide DRGN-1 promotes wound-healing of a mixed-biofilm infected wound. *NPJ Biofilms Microbiomes* 11, 3-9 (2017).
- S. M. Barksdale *et al.*, Cathelicidin antimicrobial peptide from *Alligator mississippiensis* has antibacterial activity against multi-drug resistant *Acinetobacter baumanii* and *Klebsiella pneumoniae*. *Dev Comp Immunol* 70(20), 135–144 (2017).
- E.M.C. Chung *et al.*, Chitinases are negative regulators of *Francisella novicida* biofilms. PLOS ONE 9(3): e93119 (2014).

Research Focus

The van Hoek lab is focused on the study of antibiotic-resistant and biothreat bacteria, especially gram-negative bacteria. We have projects to discover and invent antimicrobial peptides against the multi-drug resistant ESKAPE (wound-infecting) pathogens as well as biothreat bacteria. We study cell-to-cell communication and biofilm formation in these dangerous bacteria, including new ways to disperse biofilms (peptides, DSF, chitinase) and regulate biofilm formation (quorum sensing via small molecules). Additionally, we are exploring new antibacterial treatments such as peptide nucleic acids. We have discovered powerful antimicrobial peptides naturally expressed by alligators, crocodiles, and Komodo dragons, and continue to develop novel synthetic antimicrobial peptides for in vivo studies. Biothreat Bacteria: We study the fundamental microbial physiology of *Francisella tularensis*, the causative agent of tularemia. Additionally, we have projects focused on *Yersinia pestis*, *Burkholderia*, and *Bacillus anthracis*, including the ability of Nanotrap particles to be used in the detection and study of these organisms.

Current Projects

- Antimicrobial peptides to combat antibiotic-resistant bacteria and biothreat bacteria
- Computational design of antimicrobial peptides against multi-drug resistant gram-negative infection
- Francisella physiology (protein secretion, PGA production, regulatory systems, quorum sensing); Francisella chitinase enzymatic activity and biofilm regulation
- Nanotrap particles to detect markers of bacterial biothreat agents