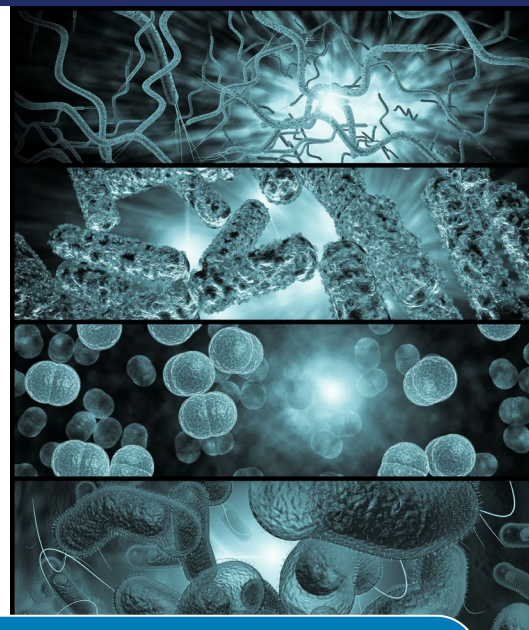




About the Division of Microbiology

Division Mission

Serve a multipurpose function including evaluating the impact of antimicrobial agents, food contaminants, food additives, nanomaterials, and FDA-regulated products on the microbiome; developing methods to detect and characterize microbial contaminants; determining antimicrobial resistance and virulence mechanisms; conducting research to aid FDA in the areas of women's health, tobacco products, and nanotechnology; and improving risk assessments.



Select Microbiology Accomplishments in 2022

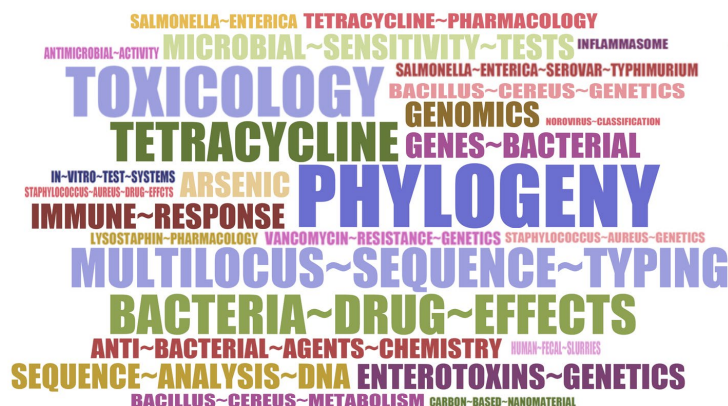
Food Safety and Virology: Antimicrobial Resistance and Virulence

- Evaluated the role of bacterial plasmids in antimicrobial resistance dissemination between bacterial pathogens, which could lead to more difficult-to-treat infections.
- Characterized companion animal-associated alphacoronaviruses that were detected in human patients with acute respiratory illness from different countries.
- Carried out studies to characterize virulence factors that can potentially contribute to increased ability of *Salmonella enterica* to cause foodborne infections.

Microbiome and Biological Interactions

- Assessed the impact of the exposure of antimicrobial drug residues on the human gastrointestinal (GI) microbiota composition and intestinal permeability. Higher exposures contributed to alterations of the microbiota and intestinal permeability.
- Continued studies on the exposure of xenobiotic compounds — including arsenic, bisphenol AF, and triclosan — on the microbiome and host responses through National Toxicological Program-funded efforts. These efforts are informing risk assessments of the test compounds.
- Conducted in conjunction with the Office of Scientific Coordination, sequencing studies on multiple bacterial species that are underrepresented in microbial sequence databases. These sequences were made available in public databases.
- Utilized transcriptomic analyses to assess the impact of continuous exposure to antibiotic-impregnated catheters on biofilm formation by the human pathogen *Pseudomonas aeruginosa*. The formation of biofilms can lead to difficulty in eradicating the bacterial population.





Microbial Contaminants Detection

- Developed and evaluated approaches to detect and enumerate *Burkholderia cepacia* complex (BCC) in pharmaceutical products. Improved and widely accessible detection methods for BCC are important to limit patient exposure to BCC pathogens that have been linked to multiple disease outbreaks
- In conjunction with the Center for Food Safety and Applied Nutrition conducted survey studies to assess the microbial contamination levels of tattoo and permanent makeup inks available on the U.S. market. The studies determined that contamination of the ink products is a potential concern, as multiple inks were found to contain microorganisms.
- Used sequencing methods to characterize potential bacterial pathogens for both veterinary and human patients.

Ongoing Microbiology Research Projects in 2023

- A Recombinant Coronavirus Spike Protein to Generate Reagents, Study Cell Interactions and Antibody-Dependent Enhancement
- Discovery of Intracellular and Extracellular Signaling Pathways and Mechanisms Contributing to Complement Activation and Coagulopathies Associated with Coronavirus Infections
- Assessment of the Role that the Microbiome May Play in the Toxicity of Xenobiotics
- Multi-Lab Validation of Isolation and Identification of Nontuberculous *Mycobacteria* Associated with Tattoo-Related Skin Infections
- Detection of Microbial Contaminants, Including Anaerobic Bacteria, in Tattoo Inks and Other Related Products
- Establishing Standardized Methods for Sporicidal Efficacy Assessment and Building Up an Efficacy Database of Sporicidal Products to Support FDA's Regulation on Drug Compounding
- Evaluation of Antimicrobial, Antibiofilm and Cytotoxicity Activity of Nanoparticles (Se, V) and Nanostructured Surfaces (Ti, Cu) and Transcriptomic and Proteomic Response of Multidrug Resistant Bacteria
- Evaluation of Tools to Efficiently Assess Antimicrobial Resistance and Pathogenicity-Related Functions of Plasmids in Bacterial Pathogens
- Evaluation of In Vitro Vaginal Tract Models to Assess the Biotherapeutic Potential of *Lactobacillus* Toward Toxic Shock Syndrome Toxin-1 Producing *Staphylococcus aureus*
- Metagenomic Analyses for the Detection of Microorganisms in Non-Sterile Pharmaceutical Products



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