MECHANISTIC ANTIVIRAL ACTIVITY OF CHITOSAN MICROPARTICLES AGAINST BACTERIOPHAGE MS2, A HUMAN NOROVIRUS SURROGATE.

Candace Barnes[1], *Rebecca Barber*[1], *Robyn Louis*[2], *Anita Wright*[1], *Melissa Jones*[3], *and Naim Montazeri*[1]

[1]Food Science and Human Nutrition Department, University of Florida, Gainesville, FL, USA
[2]Psychology Department, University of Florida, Gainesville, FL, USA
[3]Microbiology and Cell Sciences Department, University of Florida, Gainesville, FL, USA

Human norovirus is the leading cause of acute viral gastroenteritis worldwide and a public health concern because of its low infectious dose and persistence in the environment. Water plays a major role in the transmission of norovirus to humans, and effective decontamination of water can control the spread of the pathogen. Chitosan is a polysaccharide derivative of chitin and has shown promising antibacterial activity; however, limited research has been performed on its application for the antiviral treatment of water. In this study, we investigated the antiviral activity of chitosan microparticles (CM) in suspension against bacteriophage MS2, a cultivable surrogate for human norovirus. CM was generated through the ionic gelation of chitosan solution using sodium sulfate as a cross-linker while sonicating, quality assessed against the MS2 host *E. coli* strain using macrodilution broth method and size-characterized by dynamic light scattering. The CM preparation had 6% (*w/v*) dry weight and a particle size range of approximately 0.5-1.0 µm. Quality assessment of CM revealed a minimum inhibitory concentration of 0.006% (*w/v*) with no interference in infectivity assays. The impacts of CM against virus infectivity and genome integrity were assessed with plaque assay and reverse-transcriptase quantitative PCR (RT-qPCR), respectively. The infectious titer of MS2 with 0.3% CM immediately decreased to the limit of detection of 1.85 $\log_{10}$ PFU/ml, and viral genome with CM concentrations up to 0.01% decreased to the limit of detection of 1.12 $\log_{10}$ RT-qPCR units at 0-hour contact time. Further research focuses on continuing mechanistic studies using a plate-based thermal release assay (PaSTRy) to assess virus capsid and RNA stability in binding to CM, visualizing CM using electron microscopy, investigating the impact of CM on human norovirus, and assessing downstream applications in agricultural water.

PRESENTER BIO: Candace Barnes is an M.S. student in Food Science at the University of Florida (Gainesville, FL). She received her B.S. in Cellular and Molecular Biology at Hampton University (Hampton, VA) and researched adeno-associated viruses in the University of Florida College of Medicine before joining the Food Science program.