Plastic nanoparticle toxicity is accentuated in the inflamed intestinal cell model. Megan Steele (PharmD 2027) and Steven C Sutton, PhD, FAAPS (Associate Professor, Department of Pharmaceutical Sciences and Administration)

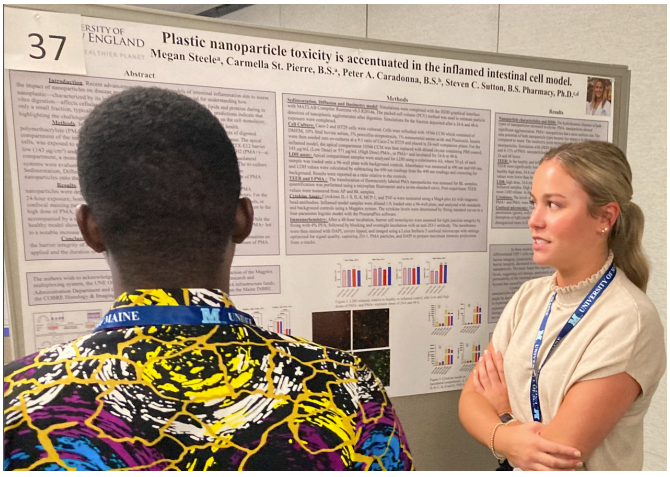
During the summer semester of 2024, as part of the Dean's Summer Fellowship, Megan Steele was working with Dr. Sutton on this project, developing skills in tissue culture and measuring the effects of nanoplastic on an immune-competent tri-culture. The goal of this project was to add to the body of research showing the effects of microplastics on humans, animals, and on the environment, and contribute to a manuscript subsequently resubmitted to the journal Nanotoxicology.

Background. A recent review of the literature pointed to the accentuating effects of chronically administered micro- and nanoparticles on colitis in mice and zebrafish (Ji 2023). Using an *in vitro* model of intestinal inflammation, we determined that a high dose c and an extended exposure of nanoplastic also accentuated inflammation.

Methods. Experiments used a permeable support separating an apical and basolateral compartment. On this support, a monolayer was grown consisting of an absorptive cell line (Caco-2) and a mucous secreting cell line (HT-29). The well (basolateral compartment) contained differentiated THP-1 cells that behaved like macrophages. The "inflamed" model was exposed to lipopolysaccharide and the pro-inflammation cytokine IFN-γ, whereas the 'healthy' model was not. The models were then exposed to polymethacrylate (PMA) nanoparticles that had been subjected to an *in vitro* digestion of salivary, gastric and intestinal composition.

Result. We found that a high dose and an extended exposure of nanoplastic *in vitro* also accentuated the inflammation in our 'inflamed' model.

Ji, J., Wu, X., Li, X., & Zhu, Y. (2023). Effects of microplastics in aquatic environments on inflammatory bowel disease. *Environmental Research*, *229*, 115974.



Megan Steele (PharmD 2027) presents her poster at the GSBSE Annual Meeting in Orono.