Whitney Perez is a fourth year PhD student in the Medical Physics program. She received her bachelor’s and master’s degree in 2017 and 2018, respectively, from Purdue University’s Radiological Health Pre-Med Physics (RHMP) 4 + 1 Graduate Program. Currently, she is working in Dr. Pérez-Torres’s lab on characterizing the side effects of cranial radiation therapy within a mini-pig model using advanced MRI and histological techniques. Somewhere along her doctoral studies, she was bitten by the science communication bug and has been trying to tie it into her dissertation ever since. Aside from research, she enjoys reading scifi/fantasy novels and spending time with her family.

While cranial radiation therapy is a powerful tool to manage brain tumors, it can cause progressive and irreversible brain injury in pediatric survivors. These radiation-induced brain injuries manifest after 6 months from the irradiation date and are identified on MRI by diffuse white matter damage without an increase in vascular permeability. These characteristic changes in white matter have been correlated to lower IQ scores, attention deficits, and learning impairments in pediatric brain tumor survivors. While rodent models are prevalently used to study the development of these neurocognitive impairments, not all rodents exhibit radiological or histological evidence of radiation-induced brain injury. Therefore, the major obstacle in the field is that treatment interventions focus on treating neurocognitive symptoms instead of addressing the neuropathology of this progressive and irreversible radiation-induced injury.

Through its research aims, this project has 1) outlined the critical need for a preclinical model that can comprehensively emulate radiation-induced brain injury as it would occur in a human; 2) shown feasibility for a hemispheric mini-pig model of radiation-induced brain injury generated with a clinical 6 MV photon irradiator and evaluated with a clinical 3T MRI; and 3) described the diffusion metrics, neurometabolite changes, and histological characteristics that present itself within this mini-pig model of radiation-induced brain injury.