VANDERBILT SCHOOL OF MEDICINE | Basic Sciences

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Biosketch

Dr. Brown was born and raised in the DC metro area. To pursue her love for research, she received her Ph.D. from Brown University in Providence, RI where she investigated protein pairs that play a role in bacterial multidrug tolerance and chronic biofilm infections. She then completed her postdoctoral training at the Massachusetts Institute of Technology where she used X-ray crystallography and biochemical techniques to study mechanisms of protein assembly in both bacteria and human metabolic systems. Arriving at Vanderbilt in 2019, her lab uses structural biology to understand how mitochondrial proteins assemble to maintain human health.

Key Publications

"Structure of the Mitochondrial Aminolevulinic Acid Synthase, a Key Heme Biosynthetic Enzyme," (2018) *Structure*, 26, 580-589

"N domain of the Lon AAA+ protease controls assembly and substrate choice," (2018) *Protein Science*, doi: 10.1002/pro.3553

"Structure of the E. coli antitoxin MqsA (YgiT/B3021) bound to its gene promoter reveals extensive domain rearrangements and the specificity of transcriptional regulation," (2011) *J. Biol. Chem.* 286, 2285-2296

"Understanding mitochondrial protein assembly in human health and disease"

The focus of the Brown Lab is to investigate **3-dimensional protein structure** in order to understand how certain **genetic mutations** can have profound impact on human health.

In several instances, proper **protein complex assembly** is critical for maintaining human health by modulating various **cellular processes** such as activity of signaling pathways, providing feedback regulation, and mediating transport and transfer of molecules among partners. Unfortunately, there are numerous painful, debilitating, and life-threatening diseases that occur due to genetic mutations that prevent proper protein assembly. Our approach is to use **X-ray crystallography** and other complementary biochemical techniques **to understand how these various mutations lead to changes in protein structure,** which is tightly correlated to protein function, thus preventing **proper macromolecular assembly**.

We focus on areas of human health related to mitochondrial biology and metabolism. Specifically, we seek to understand **assembly mechanisms responsible for regulation of heme biosynthesis**, which is altered in several blood diseases, and **maintenance of mitochondrial DNA copy number,** which has direct implication in proper neuronal development. In the future, our work will lay the foundation for **developing therapeutics** that may take advantage of previously unknown cellular avenues.