The cell surface of most Gram-negative bacteria is covered with a lipopolysaccharide (LPS) that creates a permeability barrier against many antibiotics and detergents. In addition, LPS is essential for viability in some bacteria such as *Escherichia coli*. Because LPS molecules are synthesized at the cytoplasmic membrane, they must be extracted from this bilayer, and then transported through the aqueous periplasm and the outer membrane in order to be displayed at the cell surface. In my laboratory, we study how LPS is transported across the cell envelope by the Lpt system, a multi-protein machine that spans from the cytoplasm to the outer membrane. We are currently investigating how the ATP-binding cassette (ABC) component $LptB_2FG$ extracts LPS molecules from the outer leaflet of the cytoplasmic membrane, loads them into the LptCAD periplasmic bridge, and functions as the power source for the Lpt system. Using genetic and biochemical approaches, we have identified and characterized sites in $LptB_2FG$ that are crucial for its function. We hope this knowledge will contribute to the development of small molecules that inhibit Lpt and thereby compromise the impermeability of the outer membrane, rendering Gram-negative pathogens sensitive to antibiotics.