

A Novel Method for Measuring Cell Permeability as a Number of Viable Pores Using Spectroscopy and Pore Reliant Antibiotics

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The ability to precisely measure cell permeability will be a necessary asset in the future development of intracellular antibiotics. The efficacy of the antibiotic vancomycin is reliant on cell permeability. This means that some mathematical relationship exists between cell permeability and the bacterial death rate caused by vancomycin. In order to define this correlation, the concentration of vancomycin in relation to the bacterial population over time of 2 groups were measured. One group experienced increased permeability prior to measurement, the other did not. From data acquired from these two groups, the role of cell permeability in antibiotic efficacy was incorporated into a mathematical model. It was determined that the derivative of $C(t)$ (vancomycin concentration) directly correlated with cell permeability. This is expressed in the equation $C'(t) = aP(t)$. The model allows us to make an accurate determination of cell permeability by measuring the concentration of vancomycin.

Awards Won:

Arizona State University: Arizona State University ISEF Scholarship