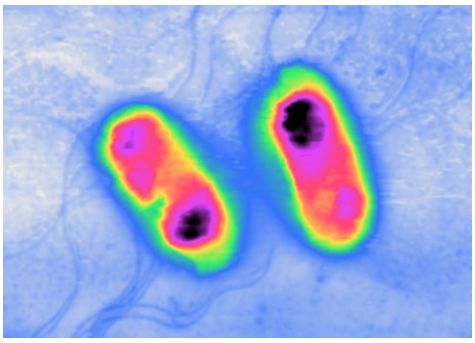
Nanotechnology and Antibiotic Resistance: Dr. Dungey's Lab

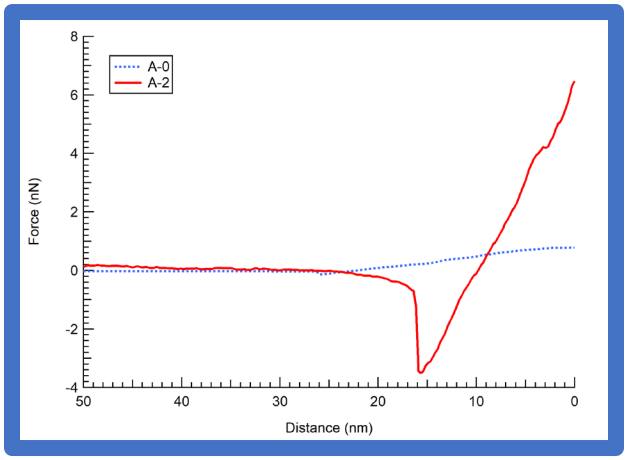
Nanotechnology, the manipulation of matter at the nanometer scale, produces new effects not seen in bulk materials (Atkinson 2003).

Atomic Force Microscopy for Imaging Biological Samples



1. E. coli magnified 60,000x in AFM.

Biological structures are related to their function, so measuring biological samples at the nanoscale can increase our understanding of biological processes. In collaboration with Dr. Sanchez-Diaz (Biophysics, UTC), students will use the atomic force microscope (AFM) to study the physical changes to bacterial cells grown in the presence of antibiotics. In particular, the size, shape and elasticity of bacterial cells will be measured.



2. Force-distance approach curves (normalized) for E. coli cells from sample A-0 (0 mg/mL ampicillin) and A-2 (16 mg/mL ampicillin).

We will compare cells grown with and without antibiotics. We will also compare cells from commercial cultures with known antibiotic resistance. We expect that cells that are resistant to antibiotics will have increased elastic modulus due to buildup of cell wall strength to restrict penetration by antibiotic molecules. Our results will be correlated with rheometer measurements, which may permit rapid detection of antibiotic resistant bacteria and improved healthcare response to infection.

For more information, click the QR code

Atkinson, W. I. (2003). Nanocosm. New York, Amacom.