Katherine Braun

Biomedical Engineering, Institute of Technology, 2010
Mentor: Christy Haynes, Department of Chemistry

NOBLE METAL NANOPARTICLE LOCALIZATION IN MAST CELLS

Nanoparticle use in consumer products and medical treatments is rapidly increasing based on the unusual chemical and physical properties of nanoscale materials. If these nanoparticles are to be implemented in biological systems, it must be seen first how the cells of the human body react to the presence of nanoparticles. An important consideration is how the nanoparticles are taken up by endocytosis and where they reside once in the cell. In this research, primary culture mast cells were exposed to serum-coated Au nanoparticles at concentrations of 1.0 nM, 0.1 nM, and 0.01 nM and for varying exposure times of 24, 48, and 72 hours. Cells were then imaged using transmission electron microscopy (TEM). It is clear from these images that the nanoparticles are congregating mainly in the acidic secretory granules, the compartment of the mast cell that contains the chemical messengers serotonin and histamine. Using TEM images, the number of nanoparticles per granule was quantitated as was the size of the nanoparticles and the size of the granules before and after uptake. Cells exposed longer took up more nanoparticles than those exposed for short periods, but high concentration nanoparticle solutions tended to aggregate, disrupting the endocytosis process and causing fewer nanoparticles to enter the cell. In parallel studies, electrochemical detection of the secreted chemical messengers demonstrated that the amount endocytosed was influenced by nanoparticle exposure time and concentration.

Poster Number: Session: