Facilitated Release of Doxorubicin from Biodegradable Mesoporous Silica Nanoparticles (MSN)

Melissa Venedicto[1] and Cheng-Yu Lai[2]
[1] Department of Biomedical Engineering
[2] Department of Mechanical and Materials Engineering

Keywords: Mesoporous Silica Nanoparticles, pH Triggered Release, Cytotoxicity

Cervical cancer is one of the most common causes of cancer death for women in the United States. The current treatment with chemotherapy drugs has significant side effects and may cause harm to healthy cells rather than cancer cells. In order to combat the potential side effects, nanoparticles composed of mesoporous silica were created to house the chemotherapy drug doxorubicin (DOX). The silica network contains the drug, and a pH study was conducted to determine the conditions for the nanoparticle to disperse the drug. The introduction of disulfide bonds within the nanoparticle created a framework to efficiently release 97% of DOX in acidic environments and 40% release in neutral environments. The denotation of acidic versus neutral environments was important as cancer cells are typically acidic. The chemistry was proved with the incubation of the loaded nanoparticle into HeLa cells for a cytotoxicity report and confocal imaging. The use of the framework for the anticancer drug was shown to be effective for the killing of cancerous cells.