Creating Potential Guidelines Based on the Effects of Silver Nanoparticles and Cadmium Quantum Dots on Saccharomyces cerevisiae

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The use of Silver nanoparticles (NPs) and Cadmium quantum dots (CdSe/ZnS)(QDs) is increasing daily in many commercially used products such as sunscreen, water resistant clothes, and may be utilized in the targeted treatment of cancer, next generation electronics, and nanorobotics. However, it is not well known what the effects of these nanomaterials are on living organisms. The Environmental Protection Agency (EPA) does not do nanomaterial research on Cadmium QDs, even though they are widely used in some kinds of LED's and many forms of bioimaging. The EPA also only requires one-time reports on nanomaterials for their production, while also only requiring a one-time report on any new, obscure nanomaterials about to be processed. In order to help create more robust and clear guidelines, I assessed the effects of the most common nanomaterials, Silver NPs and Cadmium QDs on baker's yeast, which is an excellent experimental model that mimics human cells in many aspects. I analyzed the levels of growth, cell death, and oxidative stress. My study reports that silver NPs slowed down the growth of cells more than cadmium QDs. Further, silver NPs caused more cell death, while the oxidative stress produced in response to the nanomaterials was not significant. Overall, my results suggest that the cadmium QDs are safe until a concentration of about 100 ug/mL, whereas silver NPs with a concentration higher than 5 ug/mL are more toxic, thereby warranting precautious use.

Awards Won:
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