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Functional up regulation of ribosome biogenesis in yeast treated with silver or CdSe/ZnS nanoparticles

Nanoparticles are commercially used in everyday products including zinc sunscreen and water resistant fabrics and surfaces, but in the future they may be used in the targeted treatment of cancer, printable monitoring systems and affordable phones. Understanding the effects of nanoparticles on biological organisms is crucial for the responsible use of these technologies. We investigated the effects of silver (Ag) and cadmium (CdSe/ZnS) nanoparticles on the budding yeast *Saccharomyces cerevisiae* using growth assays, FUN-1 staining for metabolic activity, RNAseq and RTPCR. Our growth assay showed that Ag has an inhibitory effect with its concentrations above 5µg/ml, whereas CdSe/ZnS had no effect on cell growth. Interestingly, cells treated with 5µg/ml Ag showed no metabolic defects. Hundreds of the same genes in both Ag and CdSe/ZnS treated cells were differentially expressed according to our transcriptome investigation, the majority of which are responsible for ribosomal biogenesis and nucleotide binding. Furthermore, we validated the RNAseq results using an RTPCR assay. The resulting expression profile leads us to suspect that Ag and CdSe/ZnS nanoparticle exposure creates a stress environment in the cell.

Speaker Biography

Kyoungtae Kim is a Professor at Missouri State University in Springfield, MO. He received his BA and MA in Biological Science at Kyungpook National University in Taegu, Korea. He went on to obtain his PhD in Biology at Florida State University in Tallahassee, Florida, and completed his Post-Doctoral at Washington University in St. Louis, Missouri, where he studied Cell Biology and Physiology. He is now located at Missouri State University where his research focuses on Diverse Cellular Processes including Endocytic Pathway, Intracellular Trafficking of Proteins and Membranes, Membrane Organization, Nanomaterial Traffic and Nanomaterial-Mediated Global Gene Expression Pattern Changes.

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