The Effect of Nanosilver Particles on the DNA Sequence of Daphnia magna across Multiple Generations

Miller, Lindsey (School: Palm Beach Central High School)

Recently, microscopic silver particles called nanosilver were discovered in bodies of fresh water such as lakes, rivers, and streams. Nanosilver can be found in many man-made consumer products like makeup, clothes, and food packaging because of their antimicrobial properties. Daphnia magna are a type of microcrustacean that is an ecological indicator species, which can show the overall effects of these particles on itself and the environment. Chlamydomonas reinhardtii was grown for 4 weeks. After the 4 weeks, the algae was equally divided into 10 tanks. Tanks 1, 2, 3, and 4 are control tanks, no nanosilver was added to them. Tanks 5, 6, and 7 are the low nanosilver tanks (.1mM concentration). Tanks 8, 9, and 10 are the high nanosilver groups (1mM concentration). In each tank, 50 Daphnia magna were added and held there for around 4 months. A sample was collected of 20 Daphnids from each group and dissolved using a KOH solution and 30% hydrogen peroxide. They were heated overnight and transferred into a different tube diluted with water. Spectrophotometry was performed on each sample. There showed to be a higher absorbance of nanosilver particles in the high nanosilver group when compared to the low nanosilver group. DNA extraction was performed on all 3 groups. PCR was performed on all samples with a GAPDH primer and then sequenced. Results showed a higher amount of differences between the control and high nanosilver group than the control and low nanosilver group. There was a higher mortality rate of the subjects in the higher nanosilver group than the low nanosilver group.. Ultimately, the nanosilver particles showed to have a high toxicity on Daphnia magna especially in higher concentrations, causing both a higher mortality rate and genetic mutations.

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