EVALUATION OF THE SAFETY OF GOLD-FUNCTIONALIZED GRAPHENE NANOPARTICLES IN THE ALTERNATIVE MODEL *Caenorhabditis elegans*

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INTRODUCTION: Graphene oxide (GO) is a promising nanomaterial with biomedical and technological applications. However, studies have shown that it can exhibit toxicity, potentially causing oxidative stress, cellular damage, and inflammation. To mitigate these effects, metal-functionalized nanoparticles, such as gold-functionalized graphene, may offer a safer alternative. In this context, understanding their health and environmental risks is essential for guiding their safe use. The alternative model *Caenorhabditis elegans* can be used due to its advantages in toxicological studies, including 60–80% genetic homology with humans, short life cycle, simple maintenance, and rapid reproduction. OBJECTIVE: To evaluate the safety of gold-functionalized graphene nanoparticles and better understand their effects on health and the environment. MATERIALS AND METHODS: Worms were cultured on Nematode Growth Medium (NGM) seeded with *Escherichia coli* OP50. The N2 (wild-type), CF1553 [(pAD76)*sod-3p*::GFP+rol-6(su1006)], and CL2166 [(pAF15)*gst-4p:*::GFP::NLS] strains were synchronized by cuticle disruption to collect eggs and ensure the same larval stage (L1). Worms were then exposed to 1 mg/L, 2.5 mg/L, and 5 mg/L of nanoparticles. Exposure involved a 30-minute incubation in microtubes followed by transfer to plates with the treatment solution for 48h. Afterwards, L4-stage worms were analyzed for survival, body length, brood size, and swimming behavior. Reactive oxygen species (ROS) levels were also measured, along with fluorescence in CF1553 and CL2166 strains, which indicate oxidative stress and detoxification responses. RESULTS AND CONCLUSION: No significant differences were observed in all assays compared to the control group at any tested concentration. The results suggest a potential safety profile for gold-functionalized graphene nanoparticles based on the evaluated parameters. Further studies are recommended to confirm uptake and whether gold functionalization reduces the toxic effects typically associated with graphene-based materials.

Nanotechnology; Oxidative stress; Nematodes.