

Morphological and behavioural alterations in *Drosophila melanogaster* offspring and adults after developmental exposure to gold nanoparticles

D. López-Aragón^{1,2*}, L. Ramos-Pan^{1,2}, L. Martínez¹, J. Moreda-Piñeiro³,
B. Laffon^{2,4}, & V. Valdíglesias^{1,2}

¹ Universidade da Coruña, Grupo NanoToxGen, CICA - Centro Interdisciplinar de Química e Bioloxía, Departamento de Biología, Facultad de Ciencias, Campus A Zapateira s/n, 15071, A Coruña, Spain

² Instituto de Investigación Biomédica de A Coruña (INIBIC), Complejo Hospitalario Universitario de A Coruña (CHUAC), Sergas, As Xubias, 15006, A Coruña, Spain

³ Universidade da Coruña, Grupo Química Analítica Aplicada (QANAP), Instituto Universitario Medio Ambiente (IUMA), Departamento de Química, Facultad de Ciencias, Campus A Zapateira s/n, 15071 A Coruña, Spain

⁴ Universidade da Coruña, Grupo DICOMOSA, CICA - Centro Interdisciplinar de Química e Bioloxía, Departamento de Psicología, Facultad de Ciencias de la Educación, Campus Elviña s/n, 15071, A Coruña, Spain

* d.aragon@udc.es

Nanoparticles (NP) are the particles of matters with the diameter usually ranging from 1 to 100 nanometres. Their composition is highly variable, and their applications differ according to their characteristics. Gold nanoparticles (AuNP) are highly promising nanomaterials in the therapeutic field due to their surface plasmon resonance property and high biocompatibility. Furthermore, due to their small size, they are able to cross the blood-brain barrier and penetrate the central nervous system, something that very few agents are able to achieve. However, this advantage may also be associated with a potential risk to the nervous system due to the accumulation of NP within this tissue cells. The objective of this study was to investigate the potential toxicological effects that oral exposure to AuNP during larvae development phase may cause in the adulthood or even afterwards in the offspring, using the model organism *Drosophila melanogaster*. With this aim, three concentrations ranging from 0.02 to 2 µg/mL of anionic and neutral AuNP were administered to the parental generation during their larvae development, i.e. individuals were exposed to AuNP only during their larval stage, after which the development of the adults was monitored until their death. Together with adult survival, the effects of the AuNP on morphology and behaviour (climbing and crawling) were assessed in adults and offspring. The data obtained yielded relevant findings in both cases: for anionic AuNP, adverse effects on the locomotor capacity of larvae were detected at high concentrations, along with size changes depending on the concentration and the characteristics of the subject (larva, adult male, or adult female). For neutral AuNP, variations in larval locomotor capacity cannot be confirmed; however, a trend toward size reduction in exposed adult females and an increase in larval size at high concentrations was observed. This study shows that anionic AuNP have a greater effect at the neurological level, impairing the motor capacity of larvae, while neutral AuNP affect development by primarily reducing the size of adult females.

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