

EFFECTS OF ORAL MAGNETITE NANOPARTICLES ON THE DEVELOPMENT OF DROSOPHILA MELANOGASTER

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Abstract

Drosophila oogenesis and developmental transitions provide an attractive system to study the biological and environmental effects of nanomaterials on the embryonic development. In this work, three types of magnetite (Fe_3O_4) nanoparticles (MNPs): UN-MNPs (pristine), CA-MNPs (citric acid modified), and APTS-MNPs (3-aminopropyltriethoxysilane coated), on the development of *Drosophila melanogaster* were studied. Our results provide the evidence that the dietary uptake of MNPs (300 g/g dosage) is more sensitivity to females than males, inducing obvious reduction in the female fecundity, and developmental delay in the larva-pupa and pupa-adult transitions, particularly in those treated by the positive APTS-MNPs. MNPs can enter into the ooplasm and vitelline membrane of *Drosophila* eggs. Further investigation demonstrated that the MNPs parental uptake disturbed the oogenesis period, inducing ovarian defect, the length of egg reduction, the number of nurse cells decrease and egg chamber development delay which subsequently induce the decrease of fecundity of female *Drosophila* and developmental delay of their offspring. By the measurement of synchrotron radiation micro X-ray fluorescence, the dyshomeostasis of trace elements Ca, Cu and Fe in abundance along the anterior-posterior axis of the fertilized eggs was found, which might be one of the important reasons for the development delay of *Drosophila*.

Keywords: magnetite nanoparticles, development, *Drosophila melanogaster*

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