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Effects of titanium nanoparticles on some blood parameters in female Wistar rats

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Nanoparticles (NPs) have potential to cause adverse effects on organ, tissue and cells due to their unusual physicochemical properties, because of their physical and chemical characteristics. NPs are being used increasingly in nanotechnology and data regarding their toxicities to animals are unsatisfactory. Titanium dioxide (TiO_2), one of the most widely used nanoparticle, was administered to mature female rats (*Rattus norvegicus* var. albinos) via oral gavage (0, 0.5, 5, 50 mg/kg b.w./day) for 14 days. Then, the levels of 19 serum biomarkers (glucose, cholesterol, creatinine, urea, triglycerides, bilirubin, protein, ALP, ALT, AST, cortisol, T3, T4, estradiol, prolactin, IgG, IgM, total oxidant, total antioxidant) belonging to different metabolic systems and the activities of osmoregulation enzymes (Na,K-ATPase, Mg-ATPase, Ca-ATPase) in the erythrocyte were measured. TiO_2 nanoparticles altered significantly all ATPase activities in the erythrocyte, except the lowest dose. Na,K-ATPase activity in the erythrocyte decreased following TiO_2 exposures (up to 80%), but the activities of Ca-ATPase (up to 274%) and Mg-ATPase (up to 290%) increased. TiO_2 nanoparticles increased significantly the levels of all the liver enzymes (ALP, ALT, AST) in the serum (up to 84%). However, the other serum parameters did not change significantly following TiO_2 administration, except bilirubin levels (81% increase). The present study demonstrated that oral administration of TiO_2 mostly affected the liver parameters in the serum and all ATPases in the erythrocyte. This study suggests carrying out further research to enlighten better the environmental fate of nanoparticles.

Biography

Mustafa Canli has completed his PhD from Glasgow University, UK and Post-doctoral studies from Ghent University, Belgium. He is a Full Time Professor in Department of Biology, Cukurova University, Turkey. He has published more than 40 papers in reputed journals and has attended many international congresses concerning ecotoxicology.

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