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## The role of some natural antioxidants in ameliorating the toxic effects of nano titanium dioxide on bone complications in rats

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**Back Ground:** Nanoparticles with a diameter between 1 and 100 nm in at least one direction may provide enhanced or novel properties that are useful for the generation of new industrial materials, medicines and consumer products. Such nanoparticles may also have toxicological properties that are different from their parental compounds (Karin et al., 2009). The wide use of nanomaterials is accompanied by the production of wastes containing nanoparticles, which could contaminate the environment and may cause health problems in human beings. Several potential health hazards are associated with the wide use of titanium.

**Objective:** titanium dioxide nanoparticles (e.g., n-TiO<sub>2</sub>). The primary aim of the current study was to detect the toxic effects of 4g/kg 50 nm n-TiO<sub>2</sub> on bone metabolism. Comparative studies were conducted to determine whether natural antioxidants, such as idebenone, carnosine and melatonin, could ameliorate the hazardous effects of n-TiO<sub>2</sub>.

**Results:** The results of this study revealed that n-TiO<sub>2</sub> treatment produced bone complications, which were confirmed by alteration of the inflammatory cytokines interleukin-6 (IL-6) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), the bone formation marker bone alkaline phosphatase (B-ALP), and the bone resorption marker C-terminal peptide of type I collagen (CTx) in treated rats compared to controls. The administration of the previously mentioned antioxidants along with n-TiO<sub>2</sub> treatment significantly modulated the alterations in most of the inflammatory cytokines and biomarkers.

**Conclusion:** It was concluded that treatment with idebenone, carnosine and melatonin protects against n-TiO<sub>2</sub> oxidative stress-induced bone complications.

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