

Amelioration of Over-Expression of bax, Nrf2 and NFK- β in Nano-Sized Titanium Dioxide-Intoxicated Mice by Potent Antioxidants

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Abstract : The increasing use of nanomaterials in consumer and industrial products has aroused global concern regarding their fate in biological systems resulting in demand for parallel risk assessment. The objective of this study is investigating either the effect of individual or combined doses of idebenone, carnosine and vitamin E on amelioration of some biochemical indices of nano sized titanium dioxide (TiO₂ NPS) induced metabolic disorders in mice liver. TiO₂-NPS was administered in an oral dose of 150 mg/kg for consecutive 14 days followed by oral daily doses of the aforementioned antioxidants for 1 month. TiO₂-NPS induced a significant elevation in serum level of ALT and AST, hepatic inflammatory markers (tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6)) and increased the percent of DNA damage which was assessed by COMET assay in addition to the apoptotic marker Caspase-3. Moreover, mRNA gene expression observed by RT-PCR showed a significant overexpression in nuclear factor relation-2 (Nrf2), nuclear factor kappa beta (NF- κ B) and the apoptotic factor (bax), and a significant down-regulation in the antiapoptotic factor (bcl2) level. In conclusion, idebenone, carnosine and vitamin E ameliorated the deviated parameters with a variable degree with the most pronounced role in alleviating the hazardous effect of TiO₂ NPS toxicity following the combination regimen.

Keywords : idebenone, carnosine, vitamin E, TiO₂ NPS, caspase-3, Nrf2, NF- κ B

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