

Title *

Comparative pulmonary toxicity of an inhaled titanium dioxide nanostructured aerosol in young adults and elderly rats.

Abstract *

The increasing industrial use of nanoparticles (NPs) has raised concerns about their impact on human health. Most of the experimental studies carried out on the pulmonary toxicity of nanoaerosols have been done on young healthy rodents. However, while age is a risk factor in developing pulmonary pathologies, few is known about the health effects of such aerosols on elderly animals. In this work we address the influence of aging on the pulmonary toxicity of inhaled titanium dioxide nanoparticles (TiO₂ NPs) in the context of a realistic occupational exposure. We exposed healthy young adults (12-13-week-old) and elderly Fischer 344 rats (19-month-old) to filtered air or to 10 mg/m³ of a TiO₂ nanostructured aerosol 6 hours/day, 5 days/week for 4 weeks and we studied the pulmonary effects immediately, 3 and 28 days after the end of exposure. Inhaled TiO₂ NPs induced in both animal groups a significant increase of neutrophilic granulocytes in the broncho-alveolar lavage fluid, immediately and 3 days after the end of exposure which decreased 30-day postexposure. In addition, histopathological analysis of lung tissue demonstrated the presence of nanomaterials in alveolar macrophages of both groups of exposed animals but no other significant change associated with NPs exposure were noticed. In conclusion, rodent exposure to such an aerosol induced an acute pulmonary toxicological response which faded overtime. However, elderly animals did not appear more sensitive than younger rats. Finally, in our experimental model, aging did not seem to increase drastically the pulmonary toxicity of TiO₂ NPs.

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