

NEUROTOXICITY OF NANOPARTICLES

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There is growing concern that long term exposure to ambient ultrafine particles may contribute to neurological and neurodegenerative disorders. Inhalation studies in rodents with these particles have revealed features of oxidative stress, neuroinflammation and neurotoxicity, as well as the accelerated formation of Alzheimer's disease related amyloid beta plaques in specific brain regions. The experimental findings are in line with epidemiological studies that showed associations between exposure to (ultrafine) particles or traffic-related air pollution and cognitive impairment. Together, such epidemiological and toxicological studies also raised concerns that, in addition to these unintentionally generated nanoparticles, manufactured nanomaterials (NMs) could harm the central nervous system. An overview is provided of recent and ongoing neurotoxicological investigations with widely used NMs such as Ag, TiO₂, CeO₂ and SiO₂. Mechanisms by which NMs can induce neurotoxicity and neurodegenerative effects will be presented in relation to their physicochemical properties and taking into account their dose and route of exposure.