Exposure to nanoparticles and immunotoxicity

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Ambient air particles that are less than 100 nm in diameter which derived from combustion and industrial manufacture are generally defined as ultrafine particles (UFPs) or nanoparticles. UFPs caused more inflammation, on a mass basis, than larger respirable particles composed of the same material. Furthermore, relative to larger particles, UFPs have a more predictable pulmonary deposition, larger surface area per unit mass, greater effect on alveolar macrophage phagocytosis, enhanced oxidant capacity, and potential to cross the epithelium. UFPs diffuse rapidly from the lung into the systemic circulation and may induce serious health problems concerns about nervous, immune and endocrine systems. Therefore, we focused on investigating the size- and dose-specific effect of instillation of ultrafine carbon black on pulmonary inflammation, and observed that repeated intratracheal instillation of ultrafine carbon black in mice leads to pulmonary inflammation, their translocation to mediastinal lymph nodes and increased chemokine mRNA expression in lung and lymph nodes size-specifically. We also demonstrated that the intranasal instillation of UFPs may influence the brain immune function depending on their size. However, there are limited reports on the effect of nanoparticles derived from industrial activities on immunotoxicity.