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TITLE: PRO-INFLAMMATORY AND POTENTIAL ALLERGIC RESPONSES RESULTING FROM B CELL ACTIVATION IN MICE TREATED WITH MULTI-WALLED CARBON NANOTUBES BY INTRATRACHEAL INSTILLATION

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ABSTRACT: The increased application of engineered carbon nanotubes (CNTs) has also raised the level of public concern regarding possible toxicities caused by exposure to these nanostructures. In this study, pulmonary and systemic immune responses induced by intratracheal instillation of multi-walled carbon nanotubes (MWCNTs) were investigated in mice. Total numbers of immune cells in bronchoalveolar lavage (BAL) fluid were significantly increased in treated groups (5, 20, and 50 mg/kg doses of MWCNTs) and the distribution of neutrophils was elevated at day 1 after instillation. Pro-inflammatory cytokines (IL-1, TNF- α , IL-6, IL-4, IL-5, IL-10, IL-12, and IFN- γ) were also increased in a dose-dependent manner, both in BAL fluid and in blood. Most of the cytokines showed the highest levels at day 1 after instillation and then decreased. Th2-type cytokines (IL-4, IL-5, and IL-10) were elevated in the treated group to levels higher than those of the Th1-type cytokines (IL-12 and IFN- γ). Furthermore, distributions of B cells in spleen and blood were significantly increased at day 1 after instillation, indicating that Th2-type cytokines had activated B cells, causing them to proliferate. Along with the additional numbers of B cells, granuloma formation in the lung tissue and IgE production were also observed, with an intensity dependent on the dose of MWCNTs instilled. Based on these observations, it is suggested that MWCNTs may induce allergic responses in mice through B cell activation and production of IgE.