

AUTHORS: Chou, C. C.; Hsiao, H. Y.; Hong, Q. S.; Chen, C. H.; Peng, Y. W.; Chen, H. W.; Yang, P. C.

TITLE: SINGLE-WALLED CARBON NANOTUBES CAN INDUCE PULMONARY INJURY IN MOUSE MODEL

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ABSTRACT: Carbon nanotubes are a nanomaterial that is extensively used in industry. The potential health risk of chronic carbon nanotubes exposure has been raised as of great public concern. In the present study, we have demonstrated that intratracheal instillation of 0.5 mg of single-walled carbon nanotubes (SWCNT) into male ICR mice (8 weeks old) induced alveolar macrophage activation, various chronic inflammatory responses, and severe pulmonary granuloma formation. We then used Affymetrix microarrays to investigate the molecular effects on the macrophages when exposed to SWCNT. A biological pathway analysis, a literature survey, and experimental validation suggest that the uptake of SWCNT into the macrophages is able to activate various transcription factors such as nuclear factor B (NF-B) and activator protein 1 (AP-1), and this leads to oxidative stress, the release of proinflammatory cytokines, the recruitment of leukocytes, the induction of protective and antiapoptotic gene expression, and the activation of T cells. The resulting innate and adaptive immune responses may explain the chronic pulmonary inflammation and granuloma formation in vivo caused by SWCNT.