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TITLE: PRELIMINARY RESULTS ON THE PATHOGENIC EFFECTS OF INTRATRACHEAL EXPOSURE TO ONE-DIMENSIONAL NANOCARBONS

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ABSTRACT: Because of the unique structural, mechanical, and electrical properties, 1-D (one-dimensional) carbon nanotubes and nanofibers have been studied For possible use in many fields from Molecular electronics to biomedical applications for several years. The 1-D carbon nanomaterials are produced presently on large scale. The inhalation of ultrafine nanocarbons can cause inflammatory lung response. The pathogenicity of 1-D carbon nanostructure remains, however, unclear.

We examined in vivo the effects of intratracheal instillation of 1-D carbon nanomaterials (NanoLab nanotubes, Pyrograf and Showa Denko nanofibers) vs. control (pure suspension fluid) on lung tissue in guinea pig model. Three months intratracheal exposure to 1-D nanocarbons caused organizing pneumonitis (Bronchiolitis obliterans organizing pneumonia) with focal non-specific desquamative interstitial pneumonia-like ("DIP-like") reaction without fibrosis or with mild peribronchiolar fibrosis in all experimental animals but not in controls. Infiltration of inflammatory cells and increase of IL-8 concentration in BAL-fluid depended on the nanomaterial used. The protein concentration in BAL-fluids in experimental animals did not differ significantly in comparison to the control group, although exudate to alveoli was observed in all the experimental groups histopathologically. Our results indicate that exposure on intratracheally introduced carbon nanotubes/nanofibers may induce measurable pulmonary pathology.