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Size and Shape of Multi-Walled Carbon Nanotubules Influences Exposure-Induced Airway Inflammation and Tissue Fibrosis in a Mouse Model

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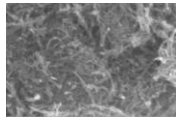
How does a single dose exposure to multi-walled carbon nanotubules of various size affect pathogenic disease in respiratory systems?

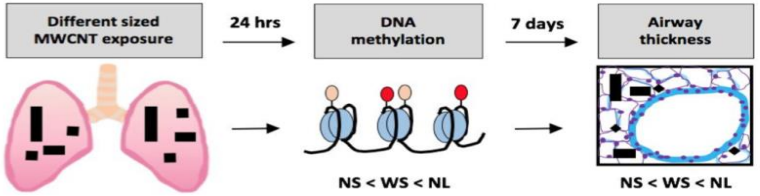
Multi-walled carbon nanotubules (MWCNT) are fibrous particles akin to asbestos. These particles can be found in a variety of consumer products despite lack of evidence that exposure to such materials is safe. Mice that inhaled carbon nanotubules of various size had observed changes to collagen in airways and interstitial tissue of the respiratory tract within just seven days of exposure.



MWCNT "Narrow Short" image. (Hamilton et al 2013)

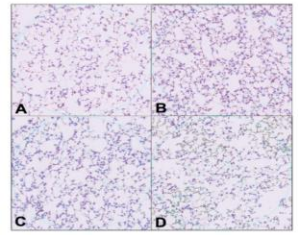
Methods

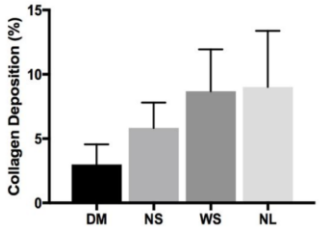
Adult C57BL/6 mice were exposed by oropharyngeal instillation to one 50 microgram dose of either wide short (WS), narrow long (NL), or narrow short (NS) MWCNTs suspended in dispersion media (DM)



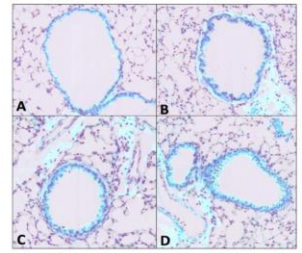
Lung tissue was collected, stained and then analyzed by (iCys) Laser Scanning Isotometry

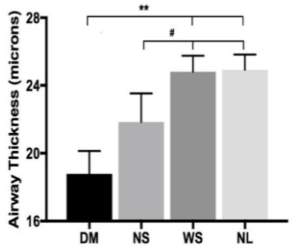
Collagen Surrounding Airways Increases in Thickness





Interstitial Tissue A) DM control group, B) NS group, C) WS group, D) NL group (Cole et al 2019, pending publication)





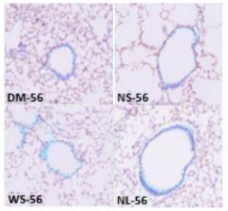
Airways A) DM control group, B) NS group, C) WS group, D) NL group (Cole et al 2019, pending publication)

Implications

The increase in collagen observed within airways and interstitial tissue suggests the beginnings of fibrogenesis, or the repair of tissue damaged by inflammation. This implies a pathogenic course similar to the progression of diseases caused by asbestos

Future directions include studies into

- Longer exposure times
- Exploration into epigenetic changes observed post exposure
- Regulation of materials and preventative measures that can be taken by people regularly exposed to MWCNT



Future 56 day study