Ubiquitous engineered nanomaterials cause lung inflammation, study finds

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A consortium of scientists from across the country has found that breathing ultrafine particles from a large family of materials that increasingly are found in a host of household and commercial products, from sunscreens to the ink in copy machines to super-strong but lightweight sporting equipment, can cause lung inflammation and damage.

The research on two of the most common types of engineered nanomaterials is published online today in *Environmental Health Perspectives*, the journal of the National Institute of Environmental Health Sciences (NIEHS). It is the first multi-institutional study examining the health effects of engineering nanomaterials to replicate and compare findings from different labs across the country.

The study is critical, the researchers said, because of the large quantities of nanomaterials being used in industry, electronics and medicine. Earlier studies had found when nanomaterials are taken into the lungs they can cause inflammation and fibrosis. The unique contribution of the current study is that all members of the consortium were able to show similar findings when similiar concentrations of the materials were introduced into the respiratory system. The findings should provide guidance for creating policy for the safe development of nanotechnology.

"This research provides further confirmation that nanomaterials have the potential to cause inflammation and injury to the lungs. Although small

amounts of these materials in the lungs do not appear to produce injury, we still must remain vigilant in using care in the diverse applications of these materials in consumer products and foods," said Kent Pinkerton, a study senior author and the director of the UC Davis Center for Health and the Environment."

Used for their ability to confer strength and flexibility because of their tubular and spherical structures, the ubiquitous and highly malleable materials may be composed of everything from carbon to gold. The current study examined the health effects of inhaling two types of nanomaterials, those made from forms of titanium dioxide and those made from multi-walled carbon nanotubes, a substance with a tensile strength 100 times stronger than steel.

The study was conducted as part of the NIEHS NanoGo Consortium, which includes researchers at North Carolina State University, UC Davis, East Carolina University, the Health Effects Laboratory of the National Institute for Occupational Safety and Health, the University of Rochester, the University of Washington and the Center for Environmental Implications of Nanotechnology.

The primary concern for exposure to nanomaterials is by inhalation, although dermal, eye and ingestion exposures also may occur during the manufacture and commercial application of these materials in a wide variety of products. The researchers examined responses of the lungs to nanomaterials made from three forms of titanium dioxide and three forms of multi-walled carbon nanotubes in a mouse model.

Provided by UC Davis

https://phys.org/news/2013-05-ubiquitous-nanomaterials-lung-inflammation.html