# Study shows nanoparticles used as additives in diesel fuels can travel from lungs to liver

November 17 2011

Recent studies conducted at Marshall University have demonstrated that nanoparticles of cerium oxide -- common diesel fuel additives used to increase the fuel efficiency of automobile engines -- can travel from the lungs to the liver and that this process is associated with liver damage.

The data in the study by Dr. Eric R. Blough and his colleagues at Marshall's Center for Diagnostic Nanosystems indicate there is a dose-dependent increase in the concentration of cerium in the liver of animals that had been exposed to the nanoparticles, which are only about 1/40,000 times as large as the width of a human hair. These increases in cerium were associated with elevations of liver enzymes in the blood and histological evidence consistent with liver damage. The research was published in the Oct. 13 issue of the peer-reviewed research journal *International Journal of Nanomedicine*.

Cerium oxide is widely used as a polishing agent for glass mirrors, television tubes and ophthalmic lenses. Cerium oxide nanoparticles are used in the automobile industry to increase fuel efficiency and reduce particulate emissions. Some studies have found that cerium oxide nanoparticles may also be capable of acting as antioxidants, leading researchers to suggest these particles may also be useful for the treatment of cardiovascular disease, neurodegenerative disease and radiation-induced tissue damage.

Blough, the center's director and an associate professor in the university's Department of Biological Sciences, said, "Given the ever-

increasing use of nanomaterials in industry and in the products we buy, it is becoming increasingly important to understand if these substances may be harmful. To our knowledge, this is the first report to evaluate if inhaled cerium oxide nanoparticles exhibit toxic effects in the liver."

Dr. Siva K. Nalabotu, the study's lead author and a Ph.D. student in Blough's lab, said, "The potential effects of nanomaterials on the environment and cellular function is not yet well understood. Interest in nanotoxicity is rapidly growing.

"Our studies show that cerium oxide nanoparticles are capable of entering the liver from lungs through the circulation, where they show dose-dependent toxic effects on the liver. Our next step is to determine the mechanism of the toxicity."

Provided by Marshall University

Citation: Study shows nanoparticles used as additives in diesel fuels can travel from lungs to liver (2011, November 17) retrieved 26 April 2024 from https://phys.org/news/2011-11-nanoparticles-additives-diesel-fuels-lungs.html