

Nanoparticles trigger cell death?

November 13 2008

Nanoparticles that are one milliard of a metre in size are widely used, for example, in cosmetics and food packaging materials. There are also significant amounts of nanoparticles in exhaust emissions. However, very little is yet known of their health effects, because only a very small portion of research into nanoparticles is focused on their health and safety risks. Nanoparticles have even been dubbed the asbestos of the 2000s by some researchers, and therefore a considerable threat to people's health. While the use of nanoparticles in consumer products increases, their follow-up procedures and legislation are lagging behind. The European Union chemicals directive REACH does not even touch upon nanomaterials.

The research teams of Professor Ilpo Vattulainen (Department of Physics, Tampere University of Technology, Finland) and academy researcher Emppu Salonen (Department of Applied Physics, Helsinki University of Technology, Finland) have together with Professor Pu-Chun Ke's (Clemson University, SC, USA) team researched how carbon-based nanoparticles interact with cells. The results provided strong biophysical evidence that nanoparticles may alter cell structure and pose health risks.

It emerged from the research that certain cell cultures are not affected when exposed to fullerenes, i.e. nano-sized molecules that consist of spherical, ellipsoid, or cylindrical arrangement of carbon atoms. Cells are also not affected when exposed to gallic acid, an organic acid that is found in almost all plants and, for instance, in tea. However, when fullerenes and gallic acid are present in the cell culture at the same time,

they interact to form structures that bind to the cell surface and cause cell death.

The research demonstrates how difficult it is to map out the health effects of nanoparticles. Even if a certain nanoparticle does not appear toxic, the interaction between this nanoparticle and other compounds in the human body may cause serious problems to cell functions. Since the number of possible combinations of nanoparticles and various biomolecules is immense, it is practically impossible to research them systematically.

The research on cell death caused by fullerenes and gallic acid was recently published in the nanoscience journal *Small* [E. Salonen, S. Lin, M. L. Reid, M. Allegood, X. Wang, A. M. Rao, I. Vattulainen, P.-C. Ke. Real-time translocation of fullerene reveals cell contraction. *Small* 4, 1986-1992 (2008)].

Source: Tampere University of Technology

Citation: Nanoparticles trigger cell death? (2008, November 13) retrieved 19 April 2024 from <https://phys.org/news/2008-11-nanoparticles-trigger-cell-death.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.