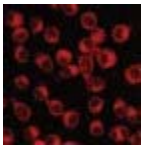

Drug smuggling safety tests

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The morphology, size distribution, and composition of a new class of composite nanoparticles with potential as drug delivery agents was determined using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), scanning TEM (STEM), and energy dispersive spectroscopy (EDS). This information coupled with cytotoxicity assessment demonstrates that it is possible to make useful nanoparticles that do not raise concerns of toxicity.

Suslick, providing evidence of nano safety

Chemist Kenneth Suslick of the University of Illinois at Urbana-Champaign and colleagues there and the Department of Pharmacology at Seoul National University in Korea have used ultrasound to create metal oxide porous, hollow metal oxide nanoparticles that are non-toxic at the cellular level. Their use as a novel delivery agent for a potent drug to fight Alzheimer's disease currently in clinical trials is now being investigated.

Ultrasound was used to make an ultrafine mist from solutions that contained precursor chemicals for the nanoparticles. The mist was then piped through a tube in a high temperature oven where micrometre-sized droplets react and form metal oxide microspheres. The researchers could then leave the major part of the microsphere (titania) was left intact while they etched away the minor part (silica) making either porous, hollow, or ball-in-ball structures. "This combination of ultrasonic spray pyrolysis (USP) and wet-chemical etching creates facinating structures, including highly porous titania microspheres," explains Suslick.

Anatase titania is known to be relatively non-toxic as a powder, but its toxicity in a nanostructured porous form has not been studied until now. The researchers tested their new material against living cells and found them to be surprisingly non-cytotoxic even in this form, which may mean they are safe enough to be utilized as drug carriers.

Suslick adds that the three tests on mammalian cells they carried out in the laboratory would suffice to demonstrate non-cytotoxicity or otherwise of any nanoparticle. "With increasing concerns that synthetic nanomaterials may be highly toxic on all-levels of life and harmful to the environment, it would be good practice if researchers can report toxicology data along with their synthesis," adds Seoul's Yoo-Hun Suh. The cell lines suggested in this study are crucial ones, including, for example, neuroblastoma cell from the human brain. There is evidence that some nanoparticles might cross the blood-brain-barrier so this test would be essential in any safety demonstration.

Related links:

- **Adv Mater, 2006, in press**
- **Suslick's Homepage**

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