Nanotechnology in Public Health

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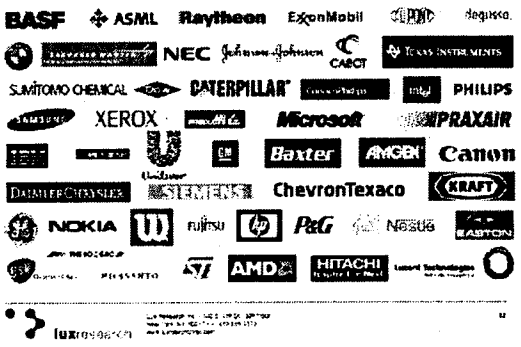
Nanotechnology and Public Health

US companies and universities hold more than 7,000 patents on nanotechnology and nanomaterials
More than $100 billion of nano-enabled products are sold each year

Industry Week, May 2007

Large corporations are embracing nanotechnology to drive product innovation



Nanoscale Particles

- Fullerenes or buckyballs
- Metal oxides (titanium, cerium, aluminum, zinc and silicon)
- Quantum dots
- Nanotubes – single and multi walled
- Nanowires, yarns and fabrics
- Dendrimers
- Iron, silver, and copper nanoparticles
- Nanoclays

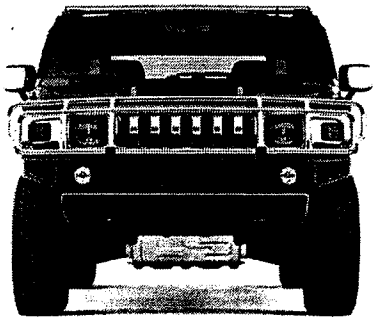
DHS Role

- DHS' role is to protect public health
- Specific activities include:
  - Provide leadership on issues that affect public health
  - Technical consultation to regulatory programs
  - Risk and hazard assessment expertise
  - Health Surveillance
  - Case studies and follow-up on complaints
  - Biomonitoring – Lead, PCBs, Mercury
  - Public education and outreach

Products that could result in human exposure to nanomaterials

- Many products we use contain engineered nanoparticles
- What are the benefits?
- Is there an exposure hazard?

The Family Car



Nanoparticle-treated upholstery

Nanotube-strengthened paint is more resilient and stays clean and shiny longer

The Washing Machine

SAMSUNG Introduces Korea's First "Silver Sterilization Washing Machine"

on Apr 15, 2003

Nanosilver particles kill 99.9% of bacteria without having to boil the laundry.-

NANOSILVER Disinfectant Spray

Protect your family by helping prevent the spread of harmful bacteria and controlling mold and mildew.

☐ How to use
. Shake can well, Hold can 15-20cm from pre-cleaned surface and spray surface until covered with mist.
. Allow to stand 10 minutes to air dry.
. No need to wipe.

☐ Where to use

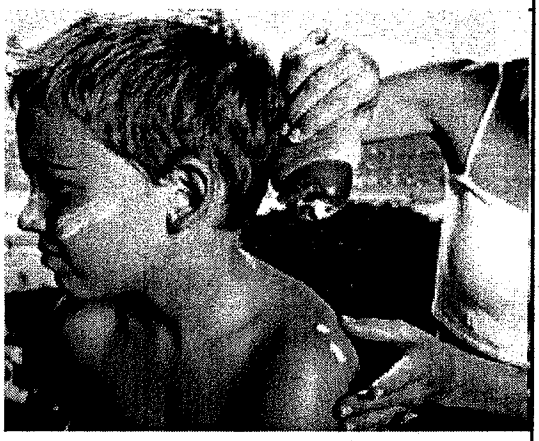
. Around toilet areas
. On telephone handsets
. On door handles
. In empty kitchen bins
. On shower bases
. In pet areas
. In sick rooms
. On toys
. Under sinks etc.

Nanosilver Beauty Soap

Nanosilver Toothpaste

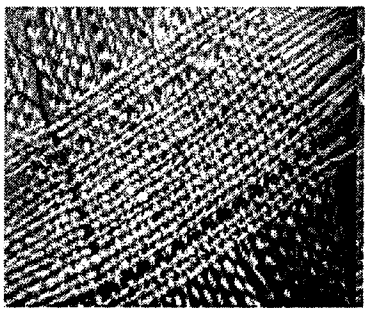
Your Sunscreen

Sunscreens contain nanoparticles of zinc oxide that can harm colon cells and may be toxic if ingested.



Chemical Research in Toxicology, April 2010

Your Shirt?

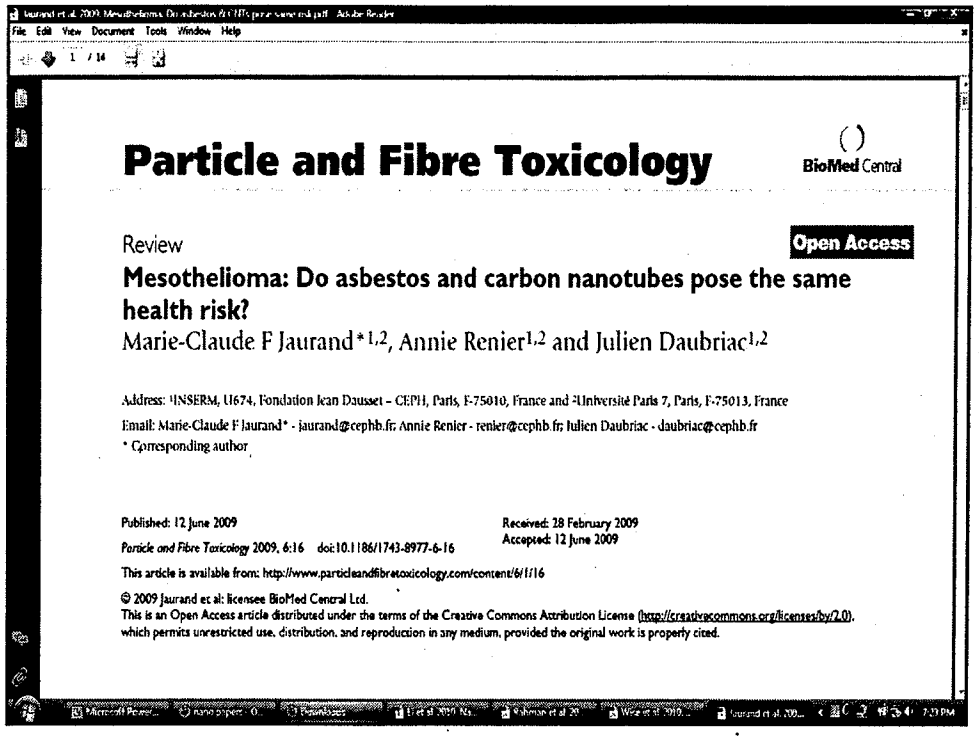


Strong, light and flexible 'smart' clothing materials can be produced through a technological breakthrough in the dry spinning of carbon nanotube fibers to make yarn.

Science Magazine, 2004

Scientific Literature

- Hundreds of articles have been published since 2000 on the biological effects of various nanomaterials.
- DHS tries to monitor the literature
- This is the type of information we would use to provide advice and outreach



Particle and Fibre Toxicology

BioMed Central

Review

Open Access

Mesothelioma: Do asbestos and carbon nanotubes pose the same health risk?

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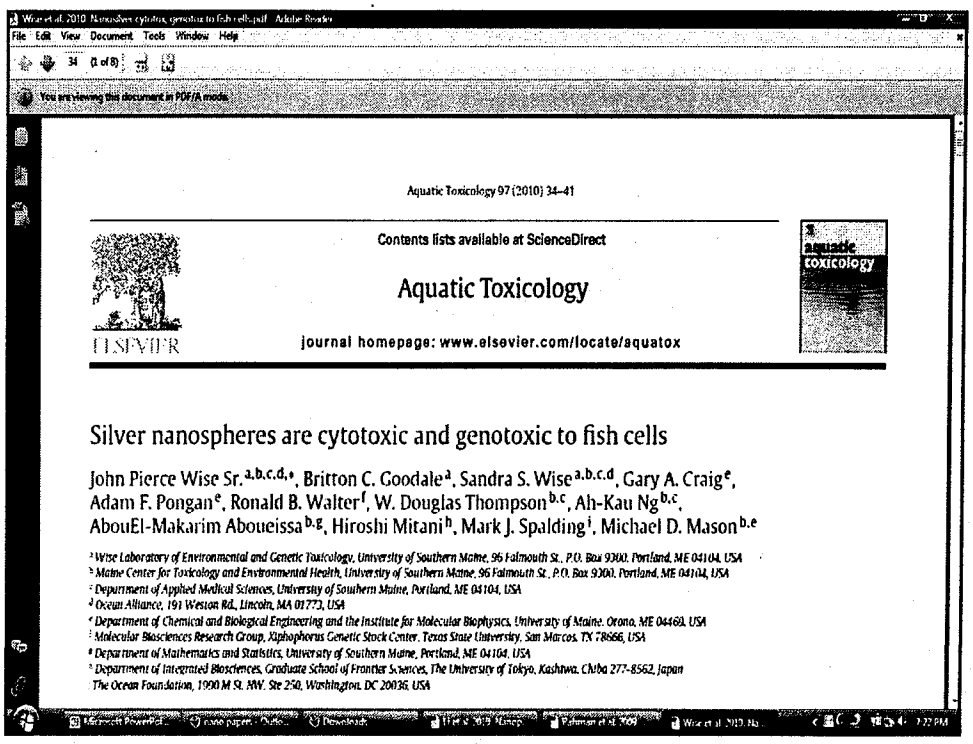

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Silver nanospheres are cytotoxic and genotoxic to fish cells

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What Do We Know?

- Nanotechnology has been around for 25 years
- Nanomaterials are designed to have unique properties
- Other states are looking into regulating nanomaterials, but no state currently does
- There is no uniform labeling requirement
- Many of the products we use contain nanoparticles

What We Need to Learn -

- **What types of nanomaterials are being produced, used and sold in Wisconsin?**
- **Which consumer products contain nanomaterials?**
- **What is the life cycle of nanomaterials?**
  - **What happens to nanomaterials in the environment? This is likely different for each type.**
  - **Can these enter the food chain? Do they bioaccumulate?**
  - **Can they contaminate our water, air or indoor environment?**
- **How do these materials affect the health of workers, consumers, wildlife and plants?**
- **Can we use risk assessment methods to establish safe levels of exposure?**

Current Work

- The Wisconsin DHS, DNR, UW and SLH have been working together for ~ 2 years to study products that contain nanosilver.
- We hope to be able to monitor nanosilver and other nanoparticles in environmental samples like house dust, wastewater, sediment and perhaps fish tissue

Thank you!

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