



Finnish Institute of  
Occupational Health

# **BENEFITS AND POTENTIAL HEALTH RISKS OF ENGINEERED NANOPARTICLES**

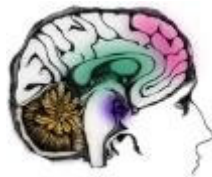
**K Savolainen**

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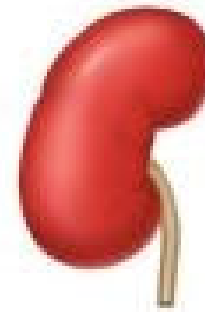
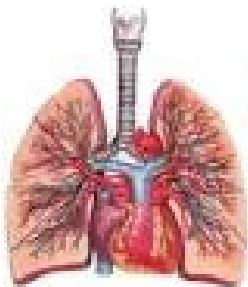
- Nanotechnology is an increasingly important area of industry utilizing matter at nano-range and having a wide variety of consumer applications
- Safety assurance and safety and toxicological research are not a part of the development concept of development of new nanoparticles or their applications
- Still the research investments to nanotechnology were 8 billion euros in 2005 and the industry expects to have a turnover of 1 trillion USD by 2015

# PUBLIC CONCERNS REGARDING SAFETY OF NANOPARTICLES

- Manganese nanoparticles can enter the brain through exposure via the nose through neuronal pathways



- Nanoparticles can disturb e.g. blood clotting and thereby microcirculation with a potential of affecting multiple organ systems



# BENEFITS AND POTENTIAL HEALTH RISKS OF ENGINEERED NANOPARTICLES

- Engineered nanoparticles appear in a variety of consumer products including clothes, sports wear, paints, even self-cleaning windows, and of course in a number of industrial applications
- About 1.5 million workers are exposed to nanoparticles today, and by 2015 the number has been estimated to be 3.5 million
- However, practically nothing is known of the effects of nanoparticles on human health or the environment
- Hence, there is an obvious need to promote research in this area

# BENEFITS AND POTENTIAL HEALTH RISKS OF ENGINEERED NANOPARTICLES

- There is an urgent need to explore:
  1. Characteristics of different particles and the basis for their biological and toxicological effects
  2. Monitoring methods to assess exposure to nanoparticles in different media and during different phases of their life-cycle (including waste)
  3. Behavior of the particles in different media
  4. Entry of different particles into the body
  5. Effects and mechanisms of effects of these particles in humans and the environment (inflammation, effects on different organs and tissues and cells, DNA-interaction)
  6. Distribution in the environment and effects on it
  7. The use of in vitro methods complemented with in vivo methods when necessary