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Safe use of nanomaterials

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Nanotechnology has introduced new materials, many of which may be classified as nanomaterials, since they are 1-100 nm in at least one dimension. Being new materials, nanomaterials have undergone extensive investigations to reveal possible toxicity. It is now clear that inhalation of low toxicity, insoluble nanomaterials is more hazardous per mass unit compared to inhalation of larger particles with the same chemical composition. Inhalation of nanomaterials induces acute phase response and inflammatory response which is proportional to the total surface area of the deposited particles [1, 2]. Acute phase response is causally linked to risk of cardiovascular disease [2]. Carbon nanotubes are new nanomaterials that appear to be especially hazardous by inhalation. One specific carbon nanotube was recently classified as 'possibly carcinogenic to humans' by the International Agency for Research on Cancer (IARC) [3], and pulmonary deposition of carbon nanotubes induces a strong and persistent acute phase response [4]. Since the hazardous effects are seen for the free nanomaterials, safe use of nanomaterials is mainly a problem in occupational settings since the consumer is primarily exposed to nanomaterials in their intended use in products, whereas workers may be exposed to free nanomaterials in production. Nanomaterials are hazardous by inhalation, and we know that workers are exposed to nanomaterials in the Danish working environment. Therefore, in order to prevent nanomaterial-induced occupational disease, the Danish Working Environment Council (Arbejdsmiljørådet) has made 23 recommendations (www.amr.dk/nano.aspx) to promote safe use of nanomaterials in the work environment.

Reference List

1. Duffin R, Tran L, Brown D, Stone V, Donaldson K. Proinflammatory effects of low-toxicity and metal nanoparticles in vivo and in vitro: highlighting the role of particle surface area and surface reactivity. *Inhal Toxicol.* 2007;19:849-856.
2. Saber AT, Jacobsen NR, Jackson P, Poulsen SS, Kyjovska ZO, Halappanavar S et al. Particle-induced pulmonary acute phase response may be the causal link between particle inhalation and cardiovascular disease. *Wiley Interdiscip Rev Nanomed Nanobiotechnol.* 2014;6:517-531.
3. Grosse Y, Loomis D, Guyton KZ, Lauby-Secretan B, El GF, Bouvard V et al. Carcinogenicity of fluoro-edenite, silicon carbide fibres and whiskers, and carbon nanotubes. *Lancet Oncol.* 2014;15:1427-1428.
4. Poulsen SS, Saber AT, Mortensen A, Szarek J, Wu D, Williams A et al. Changes in cholesterol homeostasis and acute phase response link pulmonary exposure to multi-walled carbon nanotubes to risk of cardiovascular disease. *Toxicol Appl Pharmacol.* 2015;283:210-222.