

PARTICLE-RISK
NEST INSIGHT

Cage-like fullerene molecules may pose risks to human health.

The Particle Risk project is developing methods to assess the dangers posed by new kinds of particulate matter being developed by modern science and technology. We may be exposed to the materials as they are manufactured, or by using products that contain them. The partners hope their work will promote the safe development of novel materials from new and emerging science and technology. They are also looking for ways to reduce the number of animals used in the necessary toxicity tests.

Particulate problems

The human body is constantly at risk from small particles ('particulates') that can enter the body by inhalation, ingestion or absorption through the skin. Dust, soot and pollen grains are examples of well-known particulates which can cause problems including respiratory difficulties. Some new and emerging sciences and technologies have the potential to generate novel kinds of particulates which may pose new risks. The Particle Risk project is devoted to studying the health hazards posed by new types of particulates.

Examples of innovations that are generating new particulates are novel combustion processes, developments in nanotechnology and new systems for delivery of pharmaceuticals. Nanotechnology is especially significant, since the toxicity of particulates often increases with decreasing particle size.

Advancing understanding in this field is essential because these new materials seem likely to become increasingly exploited in research, industry and everyday life, and are poised to become a major part of the European economy. They are being manufactured for use in applications as diverse as cosmetics, paints, fabrics and computing. At present, very little is known about the

possible risks to human health posed by the particulates being studied by this project.

From mouse to human

The first requirement is to gather a data bank of novel particulates and to characterise their physical properties and chemical composition. The key types of particulates being considered by the project are carbon nanotubes, the cage-like carbon molecules known as 'fullerenes', tiny semi-conductor crystals known as 'quantum dots', nano-sized gold particles and elementary carbon particles.

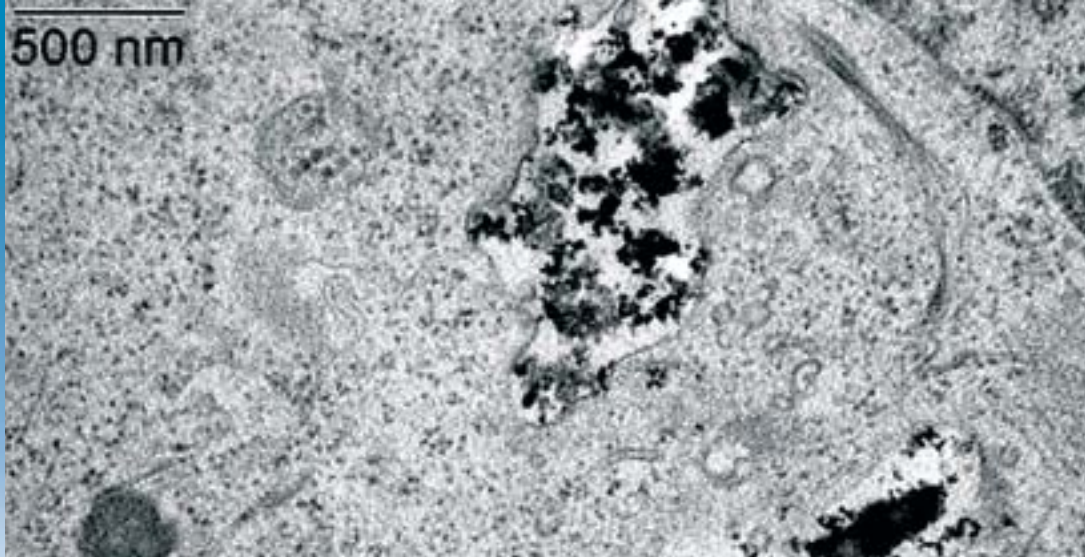
The partners will also develop methods to detect and quantify the presence of the particulates in living tissues.

Having characterised and quantified the new particulates, the next step is to conduct experiments using mice to assess the uptake and transport of the particulates in living systems. The mouse will also be used as a model *in vivo* system to investigate the toxicity of the particulates. This work will be complemented by *in vitro* tests using cultured cells.

The results of these investigations will be pulled together to assess the risk to humans.



500 nm



Carbon black nanoparticles enclosed by lung cells and tissue. © Institute of Occupational Medicine.

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AT A GLANCE

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In addition to considering respiratory and general toxicity problems, the partners will also test their hypothesis that the particulates may promote the atherosclerosis that underpins much cardiovascular disease.

Collaborating for safety

The multi-disciplinary challenges of the project are being met by a wide-ranging consortium of seven participants, with experience in particulate characterisation, aerosol physics, toxicology and risk assessment. The partners come from the UK, Italy, Germany and Denmark, and include university research departments and national institutes of occupational medicine and health.

One significant hope of the partners is that their work may reveal new *in vitro* procedures for toxicity testing which can reduce the number of laboratory animals that must be used. In this way they may address an ethical

issue of major concern to a large proportion of the European population.

At present, very little is known about the possible risks to human health posed by the particulates being studied.

Having made their initial assessment of risks, the partners intend to set up a panel of stakeholders to facilitate dialogue between the research team and key representatives of industry and regulatory bodies. This panel should contribute to timely

co-operation that can support the safe and measured incorporation of new materials into modern life in a way that reacts to potential hazards before they become big problems.

There is much concern within society at large about scientific and technological innovations. The Particle Risk project is contributing towards the goal of providing information that can allow science and technology to develop safely and in harmony with society.



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SIXTH FRAMEWORK PROGRAMME