

AAAS 2008 –Annual Meeting

Nanotechnology and Health – What are the benefits and risks?

Nanotechnology has become a buzzword for research and development at the nanometer scale in many different technology fields. It is generally associated with dimensions from about one nanometer (i.e. one billionth of a meter) to a somewhat arbitrary limit of about 100 nanometers, and manipulation of materials in order to exploit physical and chemical phenomena peculiar to matter at the nanoscale. The aim is to produce new materials and systems with high performance, unique properties and functions, which offer an extraordinary range of opportunities in many technological fields and industrial sectors.

A key feature of research in nanotechnology is the highly interdisciplinary approach that is usually required. This breaks down the borders between established disciplines, such as physics, chemistry biology, medicine, and material sciences. Nanotechnologies (in different fields) are thus very diverse and the implications of their use depend very much on their application areas.

Nanotechnology holds the potential to solve problems in very different areas, for example in environmental protection, affordable energy, waste treatment, information technology, and security issues. There are particularly high expectations in the field of human health – applications in medicine have the potential to improve the standard of healthcare across the population through earlier and better diagnosis of disease, and development of new therapies for diseases that cause the most suffering for patients and the highest burden on society.

Nanotechnology, as other new technological developments in the past, raises safety, regulatory, socio-economic and ethical issues. Due to their complexity there is a growing concern to address these issues properly. In particular, the interaction of nanotechnology-products with living organisms may entail new hazards for human health and the environment, and the use of certain products may raise questions regarding ethics or security. Analyses of potential risks posed by nanotechnology are currently focused on a specific field – the unknown toxicity of manufactured nanoparticles. As in other cases, the potential benefits and risks for human health of nanotechnology derive from the same characteristics. As an example, the translocation properties of nanoparticles in living tissue allow the development of novel pharmaceuticals (e.g. targeted drug delivery), but also raise concerns regarding adverse health effects due to greater toxicity than would be expected from the same material in different forms.

Public authorities have an important role to play in addressing risks and societal concerns. It is their task to implement transparent and robust regulations to address these issues and, if necessary, to adapt the regulatory framework to new technologies. In general, the present regulatory frameworks applied in the US and the EU seem to be sufficiently broad and flexible to handle most safety issues related to developments in nanotechnology. However, the implementation process still requires a considerable research effort to close the current knowledge gaps regarding the safety of nanotechnology and to develop appropriate technical guidance.

The symposium will illustrate the scientific and technological aspects of nanotechnology, considering in particular the benefits and risks for human health. Regulatory issues will be addressed, demonstrating the need for international cooperation. The challenge of communicating risk to the public will also be considered, stressing the need for informed decisions based on sound science.

Further information:

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