Safety: an opportunity, not an obstacle, for nanotechnology – Prof. Kai Savolainen

Professor Kai Savolainen, director of the Nanosafety Research Centre at the Finnish Institute of Occupational Health in Helsinki, coordinates the NanoSafety Cluster. He believes more needs to be done to understand the risks of nanotechnology.

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Engineered nanomaterials (ENMs) – based on high-tech components thousands of times smaller than the width of a human hair – are already a bigger part of our lives than most people know. They can be found in cosmetics, sun-block creams and dirt-resistant clothes such as coats or sports shoes. Nano-sized transistors help increase the processing power of computers, mobile phones and TV sets. And they enable a variety of surfaces to be self-cleaning, from windows and kitchen surfaces to toilet bowls.

The trouble is, these materials are so new and so small that we know next to nothing about many of their properties. That's a concern because some of them have exhibited potentially harmful effects on health and the environment. Being so small, some ENMs can gain access to the brain after being inhaled through the nose, something that has caused media headlines. Some nanomaterials have also proved to be harmful to the lungs and the cardiovascular system.

Rapid action is required to change this situation. So far, the vast majority of ENMs have not shown any harmful effects when tested for safety. But, it is very important that the scientific community and research funders place more emphasis on understanding which ENM features are associated with harmful effects to health and the environment. We need to be able to predict the risks and safety of existing ENMs and those under development in order to identify possibly harmful materials and distinguish them from those that are safe.

This is crucial because ENM advances are overwhelmingly beneficial and have been hailed as a key to future economic growth. ENMs are based on particle engineering almost at the molecular level and can have innovative technological properties. The European Commission has identified nanotechnology as a key enabling

technology (KET) as part of its Europe 2020 growth strategy. KETs are expected to generate smart, sustainable and inclusive growth in the European Union, contributing to an increase in the standard of living of EU citizens.

However, uncertainty over safety has become one of the main obstacles to their exploitation, according to an assessment by the European Commission. To alleviate the concerns, businesses need to adopt safety-by-design thinking as they develop new products based on ENMs. Equally, regulators need to take a critical look at ENM-specific regulations and legislation to ensure that there is trustworthy governance of these materials and technologies.

The only way to do this is through research into the safety and risks of ENMs in order to provide better information for the media and the public at large. So far, despite remarkable investments into investigating the effects of ENMs on health and the environment, there are still major knowledge gaps in our understanding of exactly which features of the materials could be harmful. This is partially due to limitations in our ability to assess the safety of ENMs quickly, cheaply and reliably.

While reliable, neutral knowledge is hard to obtain, it would be extremely valuable. It would be the most effective way to inform people about the safety – and, of course, the risks – of different nanotechnologies, and it would alleviate uninformed and unjustified concerns.

More information on nanotechnology, combined with a dialogue between different stakeholders and interest groups, must become a daily routine. This will lead to greater acceptance of nano-enabled applications, enabling them to be promoted more widely in a variety of products and areas. Manufacturers need to accept that the assurance of safety must be a key feature of all ENMs and nanotechnologies, and they should see this as a business opportunity and not as an obstacle. Only then will our knowledge of safety be able to keep pace with the spreading use of nanotechnology.

More info

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