Great … and small

Why nanotechnology really is ‘the next big thing’

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“Some insurers are forming nanotechnology working groups as part of their enterprise risk strategy.”

Nanotechnology is often described as the “technological revolution” that will change the way we live in the 21st century.

In an attempt not to miss out, governments and industries across the globe are increasing their research spending into what is referred to by some as the building blocks of the next industrial revolution.

While the list of possible applications seems to have no limits, the implications and risks are not yet fully understood.

Nanotechnology cuts across many different science disciplines, from chemistry and applied physics to mechanical and electrical engineering. Researchers can make use of the fact that some materials develop different properties when reduced to miniature dimensions, enabling new unique applications. An opaque substance like, for instance, copper can become transparent; a stable material like aluminium can turn combustible; or a solid like gold can be made liquid at room temperature.

The first generation of nanoparticles is already in use in different areas: in cosmetics, in suntan lotion, and as wear-resistant coatings. The oil industry relies on nanoscale catalysts for refining petroleum. In the future, nanoparticles could become essential to the development of fabrics that do not stain, light but very strong car chassis, and even clothing that can turn the sun’s energy into electrical power.

This almost unlimited potential has caught the imagination of scientists and investors alike, and the industry is expected to achieve revenues worth billions of dollars in the next decade.

One possible growth area is in the field of medications. Nano-enabled drug delivery, for instance, could specifically target the affected region of the human body in the correct doses, reducing side effects. Alternatively, tissue engineering offers the chance to reproduce or repair damaged skin and perhaps even organs. This may put an end to the agonising wait of patients for transplants.

But nanotechnology is not without its critics and opponents, who point to the uncertainty still surrounding its full implications. The main causes for concern are:

– **Health risk**
Nanoparticles can be either fixed or free and it is unclear how the free particles behave inside an organism if they are inhaled, swallowed or absorbed through the skin. It is feared that these nanoparticles could accumulate inside the organs or interfere with the biological process.

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– **Molecular manufacturing**
Will nanoparticles produce a new class of non-biodegradable pollutants which could be difficult or impossible to treat?

– **Societal risk**
Could nanotechnology exacerbate the divide between rich and poor or will it make the production of technology cheaper and therefore more accessible to the poor? Some are concerned about the potential military use of the new technology.

To develop the opportunities provided by nanotechnology, companies will want insurance cover for their products. Some have expressed concern that because of its unknown consequences, nanotechnology could become a problem of the magnitude of asbestos, with repercussions long into the future. Others believe that if the insurance industry keeps up to date with the science as it develops, their experts will be able to analyse the risks and not be taken by surprise.

Either way, some insurers are forming nanotechnology working groups as part of their enterprise risk strategy, making sure they ask scientists the right questions and understand the relevant elements of this evolving discipline. One thing is certain: with the vast growth in opportunities available to this microscopic world, insurers will continue to pay close attention to its development. XL

What exactly is nanotechnology?

It is the field of applied science and technology commonly referred to as dealing with objects smaller than 1 micrometre or between 1 and 100 nanometres. The comparative size of a nanometre to a metre is roughly the same as that of a marble to the size of the earth.

At this microscopic size some elements develop different physical traits, such as becoming more elastic or transparent, hardening, or changing conductivity properties.

The three major research sectors are:
– Nanoelectronics: Developments in microelectronics, especially for computers.
– Nanobiotechnology: Researching biological applications or building biologically inspired materials at the molecular level.
– Nanomaterials: Controlling the physical traits of material at a nanoscale level.

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