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Nanotechnology: Applications and risks

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Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers. All things, both living and non-living, are constructed of atoms. The nano-scale sparks so much interest because when a substance is artificially created, structured atom by atom; it can have different or enhanced properties compared with the same substance as it occurs naturally, which includes increased chemical reactivity, optical, magnetic, or electrical properties. Nanotechnologies aim to exploit these properties to create devices, systems, and structures with new characteristics and functions. For example, researchers hope to construct from the very bottom (that is to say, atom by atom) a substance as strong as diamond, but more flexible and far less expensive. It would also be possible to manufacture a substance in the shape and size needed such as a thin string as strong as steel. So far, nanotechnology is applied in various areas: Applied design a water filtration system on the nano-scale that is so efficient, it only lets water molecules through it; used to create filters and sensors to screen out toxins or adjust flavors, and packaging to sense when the food inside is spoiling and alert the customer; the ability to assemble nano-scale particles that could be targeted at certain parts of the body or certain viruses in the blood; economical solar cells to make solar power economical and diminish our dependency on coal, oil, nuclear fuel and fuel wood and; to clean up the environment. To clean up oil spills, imagine a scrubber built from tiny nanotubes that could manipulate the atoms in an oil spill to render it harmless. Just like any new technology, there are varieties of health, environmental and safety risks to this technology from free rather fixed manufactured nanoparticles. In initial studies, manufactured nanoparticles have shown toxic properties. They can enter the human body in various ways, reach vital organs via the blood stream, and possibly damage tissue. Due to their small size, the properties of nanoparticles not only differ from bulk material of the same composition but also show different interaction patterns with the human body. These promises and challenges of nanotechnology will be presented here.

Biography

Akbar S Khan has completed his PhD at University of Oklahoma, USA and Post-doctoral studies at University of Colorado School of Medicine at Denver, USA. He is the Senior Scientist, Program Director and Policy Advisor for a Defense Threat Reduction Agency linked with Pentagon and Office of Secretary of Defense. He has published more than 75 manuscripts in top journals including *Science* and *Nature*, six patents and has been serving as an Editorial Board Member of *Journal of Microbiology and Experimentation* and *Global Security: Health, Science and Policy*.

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