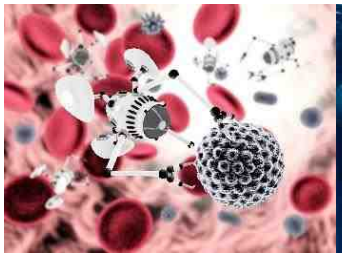
Nano Ethics

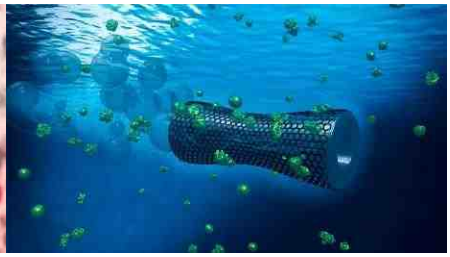
What is na

Nanotechnology is a branch of science which deals with objects that are smaller than 100nm. Advancements in nanotechnology are happening all the time: we are seeing the start of an era where what we thought was science fiction is now becoming a reality. Nanotechnology could help us protect our environment from further damage and potentially reverse the damage humans have on nature.

In the near future, we could see nanoparticles help fight diseases, ultra-efficient water filtration systems and even stain resistant clothing but unfortunately all the research conducted to help the human race could also be used to do the complete opposite.



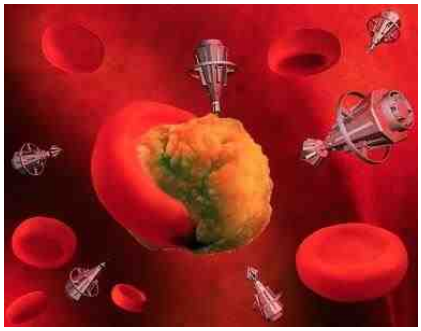
Nanobots helping fight diseases



In ocean cleaning pollution

What is the future of nanotechnology?

According to the New Atlantis article, governments around the world are funding the research into nanotechnology with billions of dollars. Many governments are very interested in this field because of what we could achieve in the future. A future, which may be somewhat wishful thinking, includes a world where it is disease free.



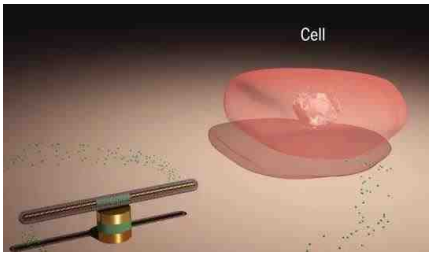
Fighting cancerous cells

About 39.6% of men and women are diagnosed with cancer at some point during their lifetimes. Unfortunately, chemotherapy does destroy living tissue which are not cancerous but with nanotechnology, cancer could be eradicated quickly, only targeting cancerous cells. Nanotechnology could help combat heart disease by helping unclog blocked blood vessels in the heart and even correcting any irregularities in pulse.

Nanobots could also help increase life expectancy. They are so small that they can fit inside individual cells and could help repair DNA cells to slow the aging process.

Why are people so pessimistic about nanotechnology?

Nanoparticles can be quite harmful to humans because they are small enough to fit into human cells and there is evidence that they cause damage inside cells. They are so small that sometimes the immune system is not triggered. This could be dangerous because they could poison animals and humans on the inside and the immune system would not know. These nanoparticles have also been known to inhibit macrophage production and cause damage to the lungs as well as breathing problems if inhaled.



World's smallest nanomotor can fit inside a cell

Many people are against this new research because we have not conducted enough experiments to determine the long term effects of nanoparticles in any given situation. For example, in nature, we do not know what will happen if the particles are ingested by animals and how it will affect the food chain, we do not know what will happen if large amounts of nanoparticles are inhaled etc.

Furthermore, knowledge of nanotechnology could be used to create weapons used in war and enhance equipment used in war. Many critics believe that these weapons could be even more deadly than the chemical weapons used in war torn countries like Syria that kill hundreds of innocent people. These weapons could kill even more people and would send humanity backwards rather than forwards.

Materials - lightweight comfortable bullet-proof battle suit

Issues concerning nanotechnology

Many people are worried because billions of dollars are invested into nanotechnology. Unlike the nanomaterial research which is proving revolutionary in the present, we may not actually be able to create nanobots that can do the things we want them to do. Without investing in the improbable nanobots, we could be helping people in LEDCs or colonising space.

Many studies have been conducted with nanoparticles on animals and the results have not been desirable. Fish exposed to nanoparticles for 48 hours showed signs of brain damage and the toxic nanoparticles were absorbed into the livers of animals. These particles could easily enter our food chain and then cause damage to humans.

The other huge question which needs to be assessed is the impact nanomaterials have on the environment. Although nanobots could help clean the air and water of pollution, nanomaterials are decomposable and can be very strong so they would be very hard to dispose of. Similar to the plastic microbeads which are also decomposable in scrubs, they

Plastic microbeads

accumulate in the ocean because they are not disposed of properly and cause damage to aquatic life. We could be faced with the same problem with nanoparticles and nanomaterials.

Seal trapped in waste not properly disposed of. In future, this seal could be trapped in nanomaterials which have collected together.

Nanoparticles may kill ecosystems (Dead coral pictured, normally home to many fish, octopi and sharks)

People frequently raise questions about social justice and equality because as developing countries do not have enough funding or human resources to support nanotechnology research and development and this will mean the benefits of nanotechnology will only be limited to countries like the United States, Japan, Germany and France. Furthermore, the creation of nanomaterials may replace natural products like rubber, cotton and coffee. This would have a devastating effect on developing countries because they countries and its farmers rely heavily on these natural exports.

Nanotechnology is likely going to help the human race but the one question we need to ask is: could it harm us more than it helps us?

Note: All pictures that include nanobots are artists' impressions of nanobots in the future

Sources

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https://www.ncbi.nlm.nih.gov/books/NBK21027/
This summary of the book on nanotechnology highlights both the positive and negative impacts of nanotechnology.

www.sciencebuzz.org/topics/nano/issues
This website sets out the pros and cons of nanotechnology in the form of a table.

http://ethics.calpoly.edu/nanoethics/paper010807
This extract from the "International Journal of Applied Philosophy" explains what nanotechnology is and explores the importance of nano ethics.

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Published from the Santa Clara University, the article talks about the possible benefits and consequences of nanotech as well as profession, legal and ethical issues surrounding it. Furthermore, it also suggests some actions to tackle these issues.

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Complete with colour diagrams, this article explains what nanotechnology will be able to do in the future and raises concerns about the new advancements in this new research.

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