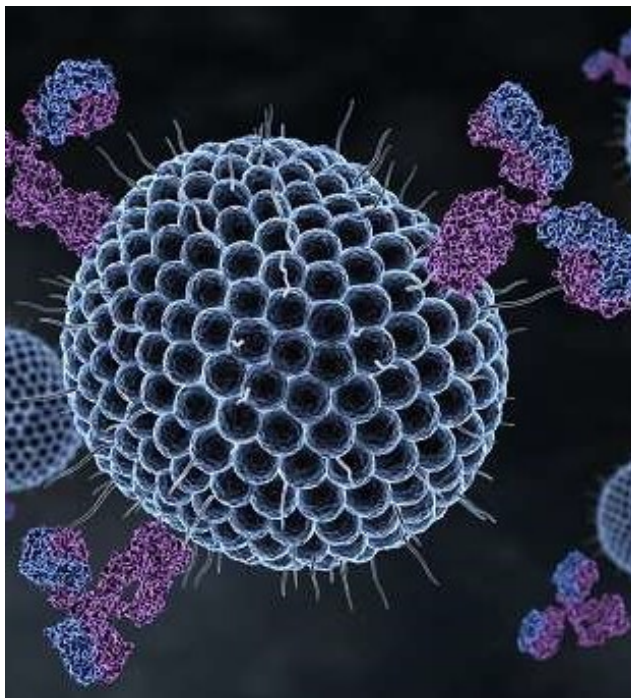


## NANOTECHNOLOGY IS CHANGING THE HEALTH CARE AND MEDICINE INDUSTRIES: THE POWER OF SMALL



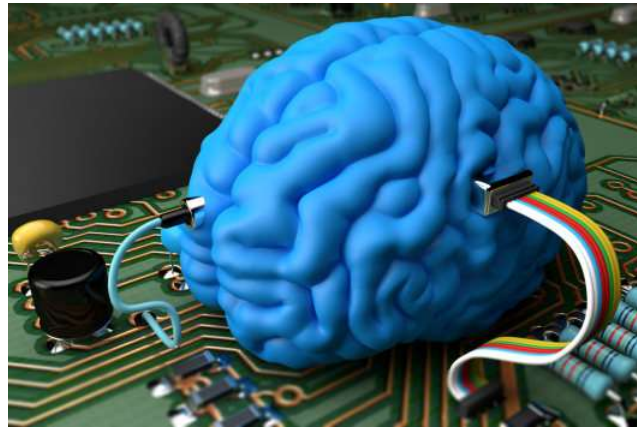
### Dr. Sunita Singh

The field of nanotechnology studies and designs ways to change matter on the nanoscale, which is the size range of one to one hundred nanometers. It's one billionth of a meter, which is about three to five atoms wide. It's important to remember that a hair is only 50,000 to 100,000 nanometers thick and an atom is only 0.1 to 0.5 nanometers wide. When things are this small, they have new qualities and behaviors that can be used in many ways. Nanotechnology could change a lot of different areas and industries, like medicine, energy, electronics, materials science, and environmental science. Climate change, pollution, disease, and poverty are some of the most important problems that need to be solved on a worldwide scale.



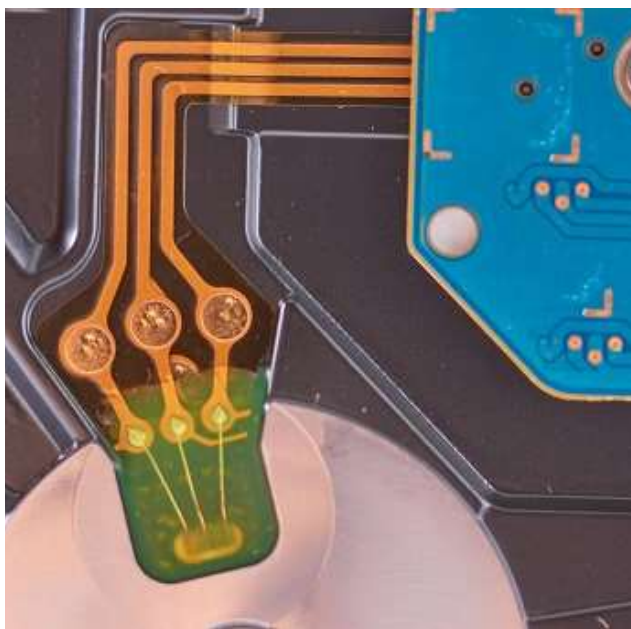
Nanotechnology has slowly but deeply changed many areas of life around the world. Nanoscale markets have grown quickly in the last ten years in the developed world, which shows how quickly new technologies are being made. Nanotechnology is no longer a new idea; it has become a tool that everyone uses. Nanomaterials have come in four stages and are used in many different areas of science. Nanoscience is making great progress very quickly. This means that nanoscale manufacturing will soon be used in almost all fields of science and technology. Classical and quantum physics can talk to each other through nanotechnology. The farming industry uses this system to make nanomedicine and nanotools for treatment and diagnosis. The medical industry also uses this system. Nanomedicines and testing kits are now being used to stop diseases that couldn't be cured before.

Nanotechnology is used in many areas and processes of medicine. Because nanoscale computers are used, medical tools like diagnostic surfaces, sensor technologies, and sample cleaning kits are being made. Nanotechnology makes it possible to create devices that can work, react, and change inside the body to help find and treat diseases early on. It can also help with tissue engineering, cell treatment, and regenerative medicine. New technologies are being made, such as "lab-on-a-chip," which can be used in nanomedicine, diagnostics, dentists, and cosmetics. Nanotechnology can help fight antimicrobial diseases and make genomics and proteomics studies better. Nanotechnology can also combine medicine, programming, nanoengineering, and biotechnology to make useful things like surgical nanorobotics, nanobioelectronics, and new ways to send drugs.

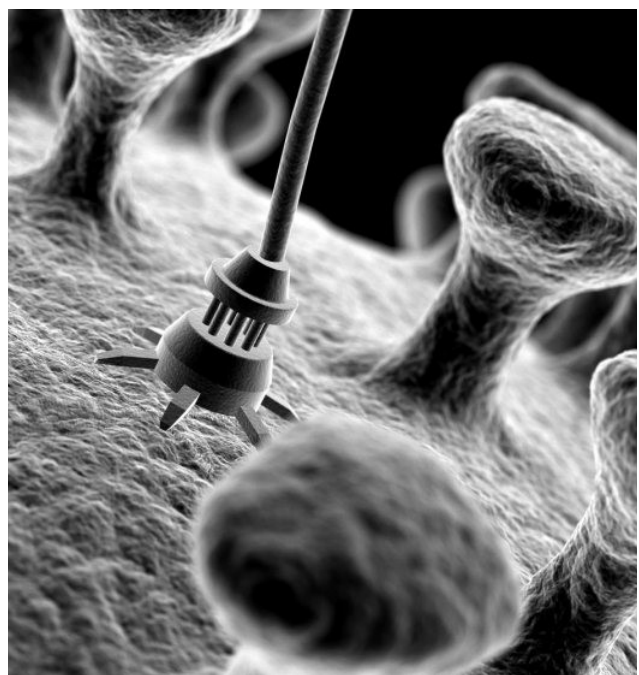


Nanodevices can check the body for any problems, toxins, or cancers that might be happening while the person is still alive. In Greek medicine, metals have been used for a long time to treat infectious diseases.

However, nanotechnology has brought a new way to improve these old methods. For example, silver nanomaterials that are very small can heal burn scars because they can easily get into the cells. Nanomaterials are used in regenerative medicine for many medical processes, like cell therapy, tissue engineering, and gene sequencing, to help treat and heal cells, tissues, and organs better. Nanotechnology is also used to kill microbes. Nanoscale technologies can find out what these germs can do at the microscopic level. As a medical tool, nanotechnology can also be used to help bones grow back. Scientists are working on bone graft technology to help muscles and bones grow back.



In particular, the progress made in nanocomputers and related devices can control how fast mechanical processes work and what results they produce. These tools make it possible for medical and dental procedures to be done correctly. Small tools and robots called nanomachines can also help doctors do precise procedures at the subcellular level. Nanodevices are being used more and more in diagnosis to guess what diseases are caused by and to decide which treatments to use. Diseases can be found more easily with in vitro testing.





Nanoscaling is another way that drug delivery technologies are thinking about how to improve the stability and pharmacological profiles of drug delivery on a big scale. Nanorobots make it possible for drugs to move through the bloodstream and get to the right places. Scientists are even working on nanorobot-based wireless nanoscale surgeries that can be done inside cells and the nucleus to treat cancers that can't be treated any other way. It is possible for these nanorobots to work very precisely.



Nanotechnology gives scientists a chance to make chemicals with very small sizes, molecular diagnostic kits, and targeted drugs that can help find and treat cancer. Scientists are trying out different ways to attach nanoparticles to current drugs in order to make the drugs more specific and easier to target in organs. Nanomedicine has hundreds of different chemicals that fight cancer.

**The author is presently working as an assistant professor of chemistry at Navyug Kanya Mahavidyalaya. Her expertise includes essential oils and their applications. She has published 27 research articles in journals of national and international repute. She has authored and coauthored eight book chapters with national and international publishing houses. She has attended a total of 35 conferences and webinars of national and international repute and delivered more than 20 invited talks and oral presentations. She is also an active member of the Association of Chemistry Teachers (India), the International Clinical Aromatherapy Network, and the Global Harmonization Initiative. email address: deptofchemistrynkmv@gmail.com**