

**Review Article****Role of nanorobotics in the treatment of different diseases and its future aspects: A Review****Meenakshi Mishra<sup>1</sup>, Vernika Dass<sup>2</sup>, Ashok Bharti<sup>3</sup>, Pankaj Kishor Mishra<sup>4</sup>**

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Swami Vivekanand Subharti University, Meerut, Uttar Pradesh****Abstract**

Small devices known as "nano robots" are made to carry out precise, sometimes repetitive tasks. Certain nanobots must have the capacity to self-assemble, reproduce like single-celled organisms, and repair themselves in the event that they sustain harm. Feynman proposed that nanomachines, nanorobots, and nanodevices could one day be used to create a wide range of precise microscopic instruments and manufacturing equipment at the atomic level, as well as a lot of tiny devices and other nanoscale and microscale robotic structures.

Nanorobots or nanobots that are completely self-sufficient could be developed using in biotech, molecular biology and medicine. Large amounts of anticancer drugs could be transported and distributed by nanorobots into sick cells without harming healthy cells, reducing the side effects of current treatments like chemotherapy damage. The final development of this innovation will have a major impact on disease detection, treatment, and prevention and will be achieved through a tight collaboration of experts in robotics, medicine, and nanotechnology. A study on several approaches to cancer treatment using nanorobots is included in this article. Additionally, it provides information about the future scope of nanotechnology.

**Key words:** Nanorobot, cancer, chemotherapy damage**Address for Correspondence:** Pankaj Kishor Mishra, Professor and Principal, Subharti College of Allied and Healthcare, Swami Vivekanand Subharti University, Meerut, Uttar Pradesh, India-250005**Email-** [pkjbiotech@gmail.com](mailto:pkjbiotech@gmail.com)**Contact:** +91-70008 92022**Introduction**

Access to essential healthcare services is at risk for nearly 5 million people worldwide by 2030. In countries like the United States, a significant factor contributing to this crisis is the widespread lack of health insurance. Without adequate coverage, many individuals are unable to afford necessary medications, routine medical visits, or basic healthcare services. This growing concern is further intensified by the global shortage of skilled healthcare professionals. As demand for medical care increases, the gap in available human resources may severely impact the quality and reach of healthcare delivery.

To counter these challenges, the adoption of advanced medical technologies has become more important than ever. One of the most promising innovations in this space is the development of **nanobots**—hypothetical microscopic machines designed to function at a scale between 1 and 100 nanometers, far smaller than a human blood cell. These nanobots are envisioned to play a major role in revolutionizing medical diagnostics and continuous health monitoring. As part of the broader landscape of advanced MedTech, nanobots represent a bold step toward more targeted, efficient, and accessible healthcare solutions<sup>[1]</sup>. Nanobots are injected directly into the blood stream which act as an internal surveillance system for the human body. Nanobots can detect changes in environmental

stimuli and search for molecular assemblies. Nanobots are used by healthcare personnel to examine and monitor patients' health in real time, as well as to record their daily nutritional needs and give medications. In general, nanomedicine is the process of detecting, treating, and preventing disease and traumatic injury, reducing pain, and conserving and improving human health by employing molecular instruments and molecular understanding of the human body<sup>[2]</sup>.

Nanotechnology, dubbed "the manufacturing technology of the twenty-first century," will enable the development of a wide range of economically complicated molecular machines (including, incidentally, molecular computers). Nanomedicine has the potential to develop technology that can function within the human body to diagnose illnesses earlier, as well as locate and measure hazardous substances and cancer cells. When inserted into the body via the intravenous route or cavities, a surgical nanorobot controlled or directed by a human surgeon can function as a semi-autonomous on-site surgeon. It will lead to the development of computer-controlled molecular instruments that are much smaller than human cells yet have the accuracy and precision of medication molecules. For the first time, such instruments will allow medicine to interfere at the cellular and molecular levels in a sophisticated and regulated manner<sup>[3]</sup>.

An integrated computer system could control the functions of the device, including detecting diseases, identifying injuries, and performing repairs through nanomanipulation. Throughout the process, it would maintain communication with the supervising surgeon using encoded ultrasonic signals. What is exciting is that the nanobots replicated by means of an entirely new form of biological reproduction. The team is working on gaining a deeper understanding of the mechanism displayed by this type of nanobot. However, it is expected to be leveraged in regenerative medicine to help treat cancer, traumatic brain injury, birth defects, and more [4]. Although ethical concerns create some uncertainty around the future of xenobots, researchers remain enthusiastic about their potential. These bioengineered organisms could play a significant role in various applications, such as removing microplastics from oceans, collecting toxins and radioactive waste from hazardous environments, enabling more precise and efficient drug delivery, and assisting in the repair of damaged cells and tissues.

### Challenges Faced by Nanobots

In general, they have contributed significantly to the advancements in nanobot development over the past several years; however, there are a few issues that must be resolved in order to effectively promote these nanobots. The development and deployment of nanobots in healthcare face several challenges. Some obstacles stem from the high costs associated with advanced development, the need for a consistent and reliable power source, and the selection of materials that are chemically non-reactive and biocompatible. On the other hand, efforts are being made to integrate nanobots into medical diagnostics and treatment while ensuring compliance with legal and ethical standards, particularly in safeguarding patient data and ensuring it is securely transmitted to authorized recipients.

Effective data transmission also depends on establishing reliable wireless networks and clearly defining signal strength parameters. Depending on the treatment duration, both biodegradable and non-biodegradable materials are employed—biodegradable materials for short-term use and non-biodegradable for long-term applications. Additionally, the safe retrieval or degradation of nanobots after completing their function is a crucial factor considered during their design and development [5].

### Substructures in a nanobots include

1. **Payload:** A small dose of drug or medicine is stored in this void section. The nanorobots could travel through the bloodstream and deliver the drug to the infection or injury site.
2. **Micro camera:** A miniature camera could be included in the nanorobot. When manually navigating through the body, the operator can steer the nanorobot.

3. **Electrodes:** Using the electrolytes in the blood, the electrode mounted on the nanorobot could form a battery. These protruding electrodes could also kill the cancer cells by generating an electric current and heating the cancer cells to death.
4. **Lasers:** These lasers could burn harmful material like arterial plaque, blood clots, or cancer cells.
5. **Ultrasonic signal generators:** These generators are used when the nanorobots target and destroy kidney stones.
6. **Swimming tail:** Because nanorobots travel against the blood flow in the body, they will require a means of propulsion to enter the body.

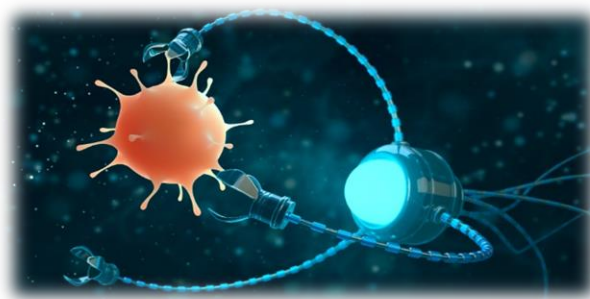


Figure 1:- Structure of nanobot

### Types of Nanorobots

Generally speaking, there are two types of nanobots: military and medicinal. When nanobots cooperate and coordinate during missions, or exhibit collaborative behaviours, the aggregate performance of the nanobots can occasionally yield superior outcomes. Certain nanobots must have the capacity to self-assemble, reproduce like single-celled organisms, and self-heal in the event of harm. Planning and processing of information Particularly significant is the processing of data gathered from the biological environment and nanobot programming. These two kinds of nano-robots are employed in military applications in addition to identification. The most often researched nanorobots are both organic and inorganic. DNA cells from bacteria and viruses are combined to generate organic nanorobots, sometimes referred to as bio-nanorobots. The organism is less harmed by this kind of nanorobot. Inorganic nanobots are more dangerous than organic ones and are made of materials such as synthetic proteins, diamond formations, and other minerals. Researchers have come up with a method to get around this toxicity problem by encasing the robot, which reduces the likelihood that the body's self-defence system will destroy it. Scientists can gain an understanding of how to energise micro and nano-sized devices using reactionary processes if they understand the biological motors of living cells [6]. The Federal Fluminense University's Chemistry Institute

developed a nano valve, which consists of a tank with a shutter over it that contains dye molecules that can exit uniformly when the cover is opened. Made of beta-cyclodextrins, organometallic compounds, and silica (SiO<sub>2</sub>), this device is also natural and will be used in medicinal settings. In certain research, proteins are used to power nanomotors that can move massive objects. DNA hybridisation and antibody proteins are also used to create nanorobots.

The process by which two complementary single-stranded DNA and/or RNA molecules join forces to generate a double-stranded molecule is known as DNA hybridisation. There are numerous chemical substances that can be used to functionalise a nanorobot. DDS, which acts directly on specific human body cells, has been studied in nanomedicine. Researchers develop tools that can concurrently modify the dosage and volume of release while delivering drugs to specific locations. Joint difficulties, dental issues, diabetes, cancer, hepatitis, and other ailments can be treated with this DDS that uses nanorobots. One advantage of this technology is its capacity to identify and treat diseases with little harm to healthy tissues, reducing the possibility of side effects and directing cellular and subcellular healing and remodelling therapy [7].

#### Medical applications of nanorobotic system

The rapid advancement of molecular robotics is increasingly transforming the healthcare industry, enabling safer and more efficient medical procedures while significantly reducing the risk of human error. Recent progress in DNA nanotechnology has further driven the adoption of nanobots in regenerative medicine, which is anticipated to contribute substantially to the growth of the global nanobot market.

Nanobot technology is being integrated into medical diagnostics and treatment, particularly in the early detection and management of chronic conditions like diabetes. Additionally, the expanding utility of microscopes and other precision instruments is expected to fuel the growth of nanobiotechnology in the coming years. Owing to their minuscule size, nanobots are capable of performing highly intricate tasks quickly and with exceptional precision—far surpassing the efficiency of conventional medical procedures.

In the current healthcare landscape, the increasing workload and stress experienced by medical professionals is a pressing concern. Nanobots offer a promising solution by automating repetitive and specialized tasks, thereby easing the burden on doctors, nurses, and other healthcare personnel.

With ongoing technological advancements, nanorobotic systems are poised to revolutionize several areas of medicine. They hold transformative potential in cancer therapy, diabetes monitoring, wound care, dental procedures, and blood diagnostics. These nanoscale robots are composed of microscopic components, each engineered to

perform specific tasks such as sensing, signaling, and processing data at the cellular level.

For instance, in diagnostic applications, nanobots can access regions of the body that traditional nanoparticles cannot reach. In targeted drug delivery, nanobots can transport medication directly to affected areas, enhancing the efficacy of treatment. In severe conditions such as cancer and cardiovascular disease, nanobots are instrumental in identifying diseased cells and delivering precise, localized therapy—thereby improving patient outcomes and minimizing side effects.

#### Nanobots in Cancer Diagnosis

One of the most important tactics in the fight against cancer is early diagnosis. However, existing diagnostic methods have limitations because of the nature of cancer. Techniques that assess different biomarkers, for instance, have been used in recent years as an early diagnosis tool; nevertheless, these techniques are limited because of the new concentrations of these biomarkers in bodily fluids. A path to extremely sensitive and precise early cancer diagnoses is provided by nanotechnology. In order to overcome the shortcomings of the present approaches and enable the early diagnosis of various cancer kinds, scientists have been working on creating a nanobot that can accurately test important cancer biomarkers at low concentration levels [8].

A folding-DNA nanobot that can precisely identify and image tumor-related biomarkers in living cells has been created by recent study. As a biorecognition tool, this nanorobot is made up of two nanoparticles connected by a DNA aptamer. Although still in its infancy, the innovative nanobot holds potential for use in early cancer detection applications.

Because of their autonomous motion and unique biomolecular interaction skills for bio-analysis and diagnostics, nanoscale robots with self-propelling and navigating capabilities have emerged as an intriguing area of research. Here, it presents a magneto-fluorescent nanorobot ("MFN") based on magnesium (Mg)-Fe<sub>3</sub>O<sub>4</sub> that can quickly and selectively separate cancer cells while self-propelling in blood without the need for other additives.

Simple surface modifications and conjugation chemistry were used to construct and create the nanobots, Mg-Fe<sub>3</sub>O<sub>4</sub>-GSH-G4-Cy5-Tf and Mg-Fe<sub>3</sub>O<sub>4</sub>-GSH-G4-Cy5-Ab, which assemble several components, including EpCAM antibody/transferrin, cyanine 5 NHS (Cy5) dye, fourth generation (G4) dendrimers for multiple conjugation and glutathione (GSH) by chemical conjugation onto one side of Mg nanoparticle [9]. The nanobots moved effectively in blood samples as well as in biological media simulations. The nanobot delivers significant increases in sensitivity, efficiency, and speed by significantly improving the capture of cancer cells. It does this by moving continuously when exposed to water and by using the Fe<sub>3</sub>O<sub>4</sub> shell on the magnesium nanoparticle for magnetic guiding. In

serum and whole blood, the nanobots demonstrated exceptional cancer cell capture efficiency of over 100%, particularly with MCF7 breast cancer cells.

### Nanobots in rescuing from diseases

Researchers utilized a well-established mouse tumor model, in which human cancer cells are introduced into mice to trigger aggressive tumor formation. Once the tumors began to develop, nanorobots were deployed to intervene. These nanorobots were constructed from flat, rectangular DNA origami sheets, each measuring approximately 90 by 60 nanometers. A critical component of their design was the attachment of thrombin—a blood-clotting enzyme—on their surface. Thrombin works by clotting blood within the vessels that supply nutrients to the tumor, effectively blocking blood flow and inducing the death of tumor tissue, similar to a localized "mini heart attack" within the tumor. To create these nanorobots, an average of four thrombin molecules were first anchored to a flat DNA scaffold. This sheet was then folded into a hollow tube-like structure, resembling a rolled piece of paper. The nanorobots were administered intravenously into the mice, allowing them to circulate through the bloodstream and target the tumor sites. The precision of these nanorobots in targeting cancer cells lies in the inclusion of a DNA aptamer—a specialized molecular payload on their surface. This aptamer was designed to recognize and bind to Nucleolin, a protein found in high concentrations on the surface of tumor endothelial cells but absent on healthy cells. This targeting mechanism ensured that the nanorobots selectively attacked cancerous tissues while sparing normal, healthy cells <sup>[10]</sup>.

### Working procedure of a nanorobot

In the modern era, numerous advanced fabrication methods have been applied to the development of classical nanorobots. Techniques such as electrochemical deposition, physical vapor deposition, strain engineering of nano-microtubes, and direct laser writing have played key roles in their production. However, the growing demand for biocompatibility and precise control has led to the emergence of microfluidic technologies for synthesizing micro- and nanorobots.

Microfluidics involves the manipulation of small fluid volumes within microscale channels to create functional devices. Compared to traditional fabrication methods, this approach offers several advantages, including enhanced biocompatibility, the ability to integrate complex structures, and precise control over chemical composition—making it highly suitable for biomedical applications.

Nanorobotics function by using Nanorobots—also referred to as nanoscale robots—are used in nanorobotics. Nanorobots' functionality and design can differ based on: nanoscale robots, sometimes referred to as nanorobots. Nanorobots' functionality and design can differ based on:

Nanorobots' sensors could identify particular signals or circumstances, such as the presence of a particular kind of substance or molecule, and then relay this data to the control system. This data might then be used by the control system to determine what the nanorobot should do.

The actuators of the nanorobots could be used for a variety of tasks, such as movement, drug release within the human body, and material and structural manipulation.

Nanorobots must be able to navigate and interact with their surroundings in order to carry out their intended duties. Numerous techniques, such as self-propulsion, remote control, or chemical or biological mechanisms, can be used to achieve this.

### Cancer detection and diagnosis

Because early cancer detection can significantly improve patient survival rates, it is critically important. Research on tumor-killing nanorobots continues to advance, and as nanorobot designs become more sophisticated, early-stage clinical cancer diagnosis becomes more precise and efficient. Using positron emission topography, Maheswari ET. AL. presented an additional tumor-detecting nanorobot that could investigate the growth of tumour cells in vivo.

To enable the nanorobot to be controlled via pre-programmed processes on the Arduino software platform, an embedded system was installed in the interim. The nanorobot was constructed using an isotope-labeled nano-carbon material to prevent any possible negative effects on the human body. Because of their dependable stability and safety, nanorobots won't injure a human after being put into their body.

The nanorobot will be expelled from the human body as waste after completing the predetermined activities. The nanorobot is made up of a sensor, a power source, and a camera, just like a macro-robot. Furthermore, sophisticated algorithms were used to determine the quickest path, and the integrated sensor aids in the nanorobot's obstacle avoidance.

On the surface of cancer cells, overexpressed biomarkers make excellent targets for biomedical engineering, treatment, and disease diagnosis. A 3D DNA nanorobot was created and manufactured by Peng et al. With bispecific recognition, this 3D DNA-based logic gate nanomachine was created to target overexpressed cancer cell biomarkers. Additionally, the DNA nanorobot has a great deal of therapeutic promise for application in the clinical treatment of tumours and can execute Boolean logic operations on the cancer cell membrane <sup>[11]</sup>.

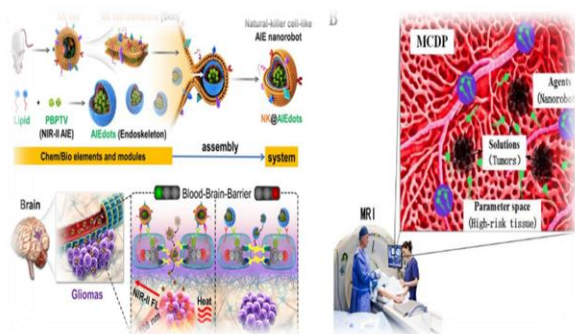
Under the driving force, scientist created a nanorobot that could identify cancer cells in the blood and deliver the medication to the tumour location. This nanorobot had the capacity to harvest blood energy and store electricity in an integrated capacitor. Generally speaking, cancer cells have higher glucose levels than healthy cells.

A high glucose level can encourage the growth and spread of cancer cells. In order to identify cancer cells by detecting the increased amount of glucose-driven electric current in cancer cells, a glucose sensor was immobilised to a CNT-based nanorobot. At the same time, this method might allow the electric current to activate a nanoelectromechanical (NEM) relay (mechanical transistor), which would break the chamber ceiling and reveal a medication that the immune system has designated for cell eradication. This concept is in line with the effort on designing an autonomous computational nanorobot for in vivo medical diagnosis and treatment.

Natural Killer (NK) cells are a type of lymphocyte that play a crucial role in the body's innate immune defense. Notably, they possess the ability to cross the blood-brain barrier (BBB), enabling them to participate in immune responses within the central nervous system.

As previously reported, NK cells were employed in cancer immunotherapy. By encasing the NK cell membrane on an AIE-active polymeric nano endoskeleton, Deng et al. created NK cell-mimic nanorobots with aggregation-induced emission (AIE) characteristics.

When photo-excited, the nanorobots may produce intense fluorescence in the NIR-II area and are biocompatible. Additionally, by unzipping tight junction structures, they might self-helpfully penetrate the brain-blood boundaries and concentrate at brain tumour sites in the intricate brain matrix, allowing for high contrast tumour imaging and skull penetration.



**Figure 2:** Advances in medical nanobots for future cancer treatment

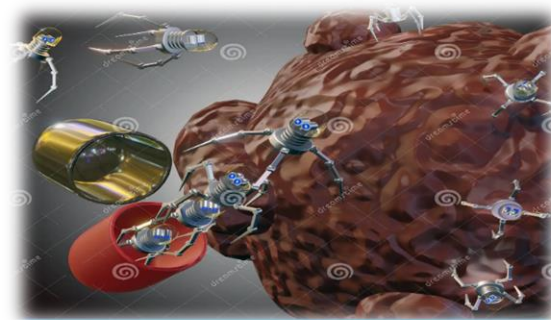
### Application of nano robots in cancer treatment

An early diagnosis will increase the patient's chances of receiving cancer treatment. Early on in the development of cancer, tumour cells are detected by nanorobots equipped with chemical biosensors, or nano sensors. The existence of cancerous cells within the body will be detected by this nano sensor. The majority of anticancer medications have a narrow therapeutic index, which can lead to gastrointestinal problems, haematological side effects, and toxicity to healthy stem cells, among other things. The primary characteristic of neoplastic cells is their fast division, which is destroyed by

conventional chemotherapeutic drugs. The majority of anti-cancer medications, such as doxorubicin, are used to treat a variety of cancers, including Hodgkin's disease (HD), when treatment is given in conjunction with other antineoplastic agents to lessen their toxicity.

Nanorobots, functioning as devices that circulate through the bloodstream, offer valuable support in key aspects of cancer treatment. When equipped with chemical biosensors, these nanoscale tools can detect cancer cells at an early stage within the body, significantly improving the chances of timely diagnosis and intervention.

For this purpose, integrated nano sensors can be used to determine the strength of Cadherin signals. Therefore, for the use of nanorobots in cancer therapy, a hardware architecture based on nano bioelectronics is developed. Researchers have genetically modified *Salmonella* bacteria to respond to chemical signals emitted by cancer cells, guiding them directly to tumor sites. Once at the tumor, these bacteria—each carrying tiny robotic components about three micrometres in size—automatically release drug-loaded capsules. This innovative nanorobot system, referred to as a "bacteriobot," delivers medication precisely to the tumor, effectively targeting cancerous cells while minimizing damage to healthy tissues. As a result, this approach helps avoid many of the harmful side effects commonly associated with traditional chemotherapy.



**Figure 3:** Nanorobots targeting tumor site.

### Breast Cancer Nano-Theranostics (BC):

Nanorobots are engineered to perform highly specialized functions at microscopic scales, even down to the molecular or organelle level. In the context of breast cancer, these advanced nanodevices offer promising solutions to several critical challenges. These include the heterogeneity of breast cancer, the limitations of non-specific drug delivery, the invasiveness of conventional diagnostic and surgical procedures, resistance to standard cancer therapies, and the need for real-time tumor tracking. By addressing these complexities, nanorobots play a vital role in enhancing the precision and effectiveness of breast cancer theranostics.

#### Microrobots for long-range cancer targeting

The effectiveness of microrobots in cancer treatment largely depends on the tumor's location and the most

suitable delivery route. Tumors located in the gastrointestinal or reproductive systems can often be accessed through oral, rectal, or vaginal administration, which allows for more flexibility in microrobot size and design. These localized delivery routes typically involve fewer constraints compared to other methods.

On the other hand, **systemic administration** is particularly advantageous for targeting a wide range of solid tumors across the body, as well as blood-related cancers and circulating metastatic cells. This method enables microrobots to travel through the bloodstream, providing broader therapeutic reach and potential for treating multiple tumor sites simultaneously. To a certain degree, systemically circulating microrobots will share traits with nanoparticles, such as the ones mentioned above, which will enable them to evade biological filters and spread. In this regard, it is notable that fabrication methods can be limited to certain size regimes. Only lately, for instance, have bottom-up self-assembled synthetic microrobots been expanded to tiny, sub-micrometer regimes that are best suited for systemic use.

It's exciting to see that the first in vivo results for synthetic microrobots smaller than a micrometre are showing that their motion can significantly increase extravasation into tumour tissues. By avoiding biological filters like the lung, liver, spleen, and kidney, other administration routes—such as through the reproductive system or the gastrointestinal tract—allow for the targeting of specific tumours or cancer lesions inside these systems without the need for systemic circulation. The precise interactions between microrobot motility, size, shape, and composition that impact the half-life, biodistribution, and long-range cancer targeting efficiency of various microrobot types in vivo will be clarified by future systematic research. In order to access sick tissue, NPs can also be designed to change form in response to biological substances. DNA strands are affixed to tiny pieces of metal that make up these shape-shifters. Modular NPs are used in the targeted molecular delivery system, and the presence of particular DNA sequences can change their size, shape, and chemistry. Until a DNA strand attaches itself to a DNA sequence that is recognised as a cancer marker, the NPs remain innocuous in the bloodstream. Following this, the particle undergoes a shape change before performing its intended job, which is to target the cancer cells, expose a medication molecule to the diseased cell, and tag the cancerous cells with a signal molecule. Theoretically, this method might be used into customised nanomedicine treatments, further customising the particles to deliver medications just to designated tumours<sup>[12]</sup>.

**Source of Support: Nil**

**Conflict of interest: Nil**

**Acknowledgement:**

**References**

1. M. Saha Nanomedicine: Promising Tiny Machine for the Healthcare in Future-A Review, *Oman Med. J.*, 24(4) (2009), pp. 242-247.

2. R.A. Jr. Freitas The future of nanofabrication and molecular scale devices in nanomedicine, *Stud. HealthTech. Inform.*, 80 (2002), pp. 45-59.
3. C. Ralph, Merkle. *Nanotechnology and Medicine, Advances in Anti-Aging Medicine*, edited by Dr. Ronald M. Klatz, Liebert press, (1996), pp. 277-286.
4. K. Soni, A. Pandey, A. Sarakar, A. S. Thakur, M. Chaturvedi Nanorobots currents trends and applications. *Int. J. Novel Res. Dev.* 9 (4) (2024), pp. 2456-4184.
5. L. Wang, W. Wang, Z. Rui, D. Zhou The effective combination therapy against human osteosarcoma: Doxorubicin plus curcumin co-encapsulated lipid-coated polymeric nanoparticulate: Drug delivery system". *Drug Delivery* 23 (2016), pp. 3200-32008.
6. R. Afshin Types of Nano Robots (Nano Robots) In Terms of Classification and Structure., *International Journal of Advanced Mechatronics and Robotics (New Jersey) University.* 8 (2021), pp. 7-11
7. M. Aggarwal, and S. Kumar The Use of Nanorobotics in the Treatment Therapy of Cancer and Its Future Aspects: A Review, *Cureus.* 14 (9) (2022), pp. 2-8.
8. L. Dong, G. Ruirui, W. Bin, Hu Jiawang, Lu. Yuan, (2022). Magnetic Micro/Nanorobots: A New Age in Biomedicines. *Adv. Int. Sys.* 4 (2022), pp. 1-19.
9. D. W. Ravindra, Kshama D. D. Ravindra, S. R. Chinmay, P. C. Govind, V. T., Yuvraj N. P. Bhausasheb, S. G. Sandesh, S. B. Shashwat (2021). Water-powered self-propelled magnetic nanobot for rapid and highly efficient capture of circulating tumor cells. *Commun Chem.* 4(1) (2021), pp. 159-165.
10. W. Yang, B. Igor, B. Ieva, R. L. Iris, S. Boxuan, Y. Yang, L. Marco, W. Janine, S. Ioanna, K. Zhu, R. A. Harris, B. Hogberg A DNA robotic switch with regulated autonomous display of cytotoxic ligand nonopatterns. *Nature Nanotechnology,* 19 (2024), pp. 1366-1374.
11. X. Kong, P. Gao, J. Wang, Y. Fang, K.C. Hwang. Advances of medical nanorobots for future cancer treatments. *J. Hem. Onco.* 14 (2023), pp. 16-74.
12. A.L. Fymat Nanobiotechnology Advances in Oncology. *Adv. Bioeng. Biom. Sci. Res.* 1 (2018), pp. 1-6.

**How to cite this article:** Mishra M, Dass V, Bharti A, Mishra P K. Role of nanorobotics in the treatment of different diseases and its future aspects: A Review. *Subharti J of Inter disciplinary Research*, Dec. 2025; Vol. 7: Issue 3, 41-6