

# Nanotechnology in Medical Science

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**Abstract:-** [Nanotechnology is the study of extremely small structures, having size of 0.1 to 100 nm. Nano medicine is a relatively new field of science and technology. Nanomedicine seeks to deliver a valuable set of research tools and clinically useful devices in the near future. Brief explanation of various types of pharmaceutical nano systems is given. The process of drug delivery using nanotechnology is described here. Cancerous cells can also be identified and cured using nanotechnology. Process of implementation of nanotechnology in neurology is also described here. Nanotechnology can be used in blood purification also. Brief description about diagnostic nanomaterial is given. Nanomaterials can be used to treat blood disorder diseases. Nanomaterials can thus play a key role in saving millions of lives.]

**Keywords:-** [ nanomaterial, GNPs, Cancerous cell, nanomedicines, neurology, toxins, nanochip ]

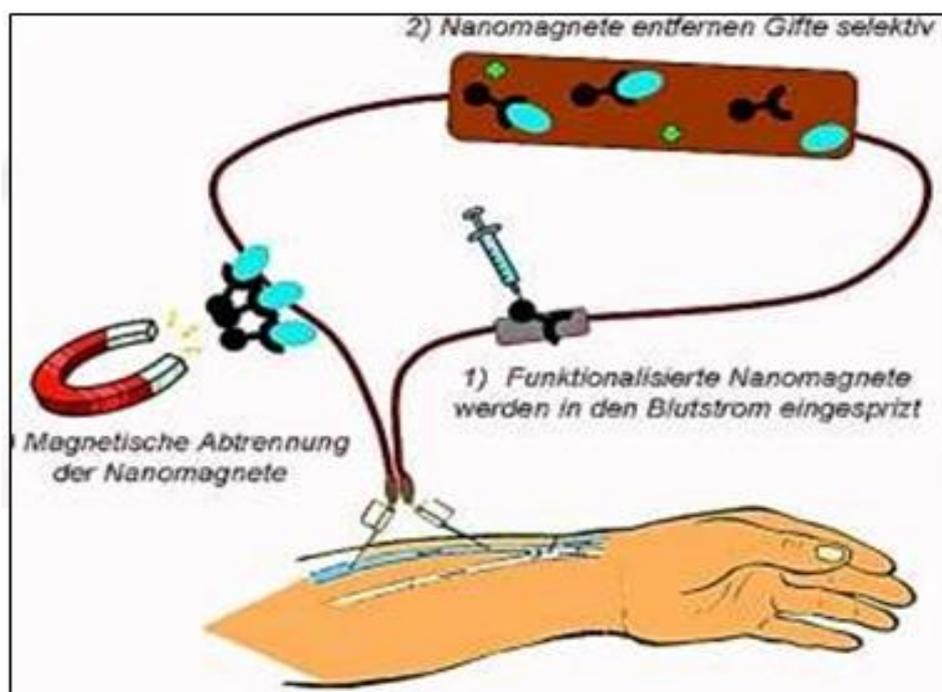
## I. INTRODUCTION

Nanotechnology has a wide range of application in the medical field. Researches are being performed by the scientists around the entire globe regarding the application of nanotechnology in medical field. Nanotechnology is being used in developing countries to help treat disease and prevent health issues. Nanomaterials used in nanotechnology have specific mechanical, optical, electrical and chemical behaviors for which they can be used in medicines and pharmaceuticals for the sensitive detection of key biological molecules, more precise and safer imaging of diseased tissues.

## II. USES OF NANOTECHNOLOGY IN MEDICAL FIELD

### A. Nanotechnology Used in Blood Purification :

Nano drones using nanomaterials can be made which can detect toxins and pathogens and get attached to them and then they can be selectively removed from the whole blood within minutes. Functionalized nanomagnet can access substances of different masses and sizes whereas other blood purification techniques available on the market are hampered by filter cut offs or slow pore diffusion in membranes.

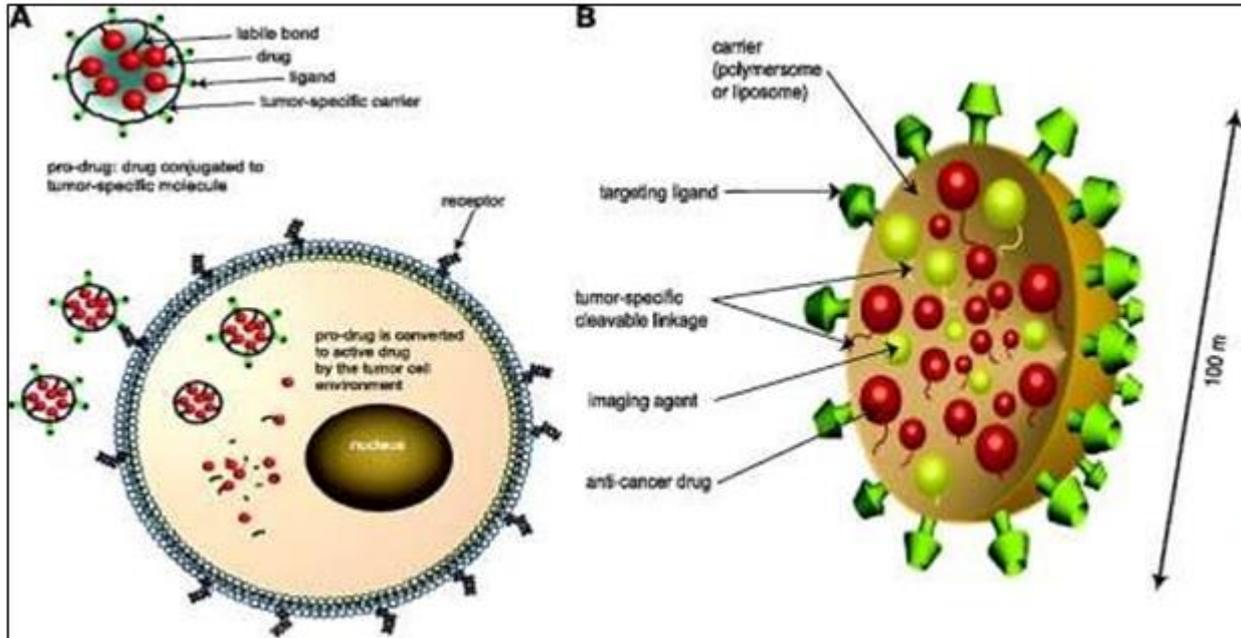


**Fig 1:** Blood Purification Using Nanomagnet

**B. Drug Delivery in Patients Using Nanotechnology :**

There are parts in our body which if affected due to some disease drugs cannot reach there through blood vessels (means through circulatory system) efficiently. Nanotechnology can play a key role here. With the help of Nano drones made with nanomaterials drugs can be transported to that parts of the body for their recovery or treatment. This

will also not harm the normal cells in the body which might otherwise have been affected if drug was passed through blood vessels. It also ensures controlled release of drugs at target organs. In nanomaterials (GNPs : Gold Nanoparticles, AuNPs : Silver Nanoparticles) the surface area is also large therefore it has greater affinity for drugs and will act on target parts/organs efficiency.

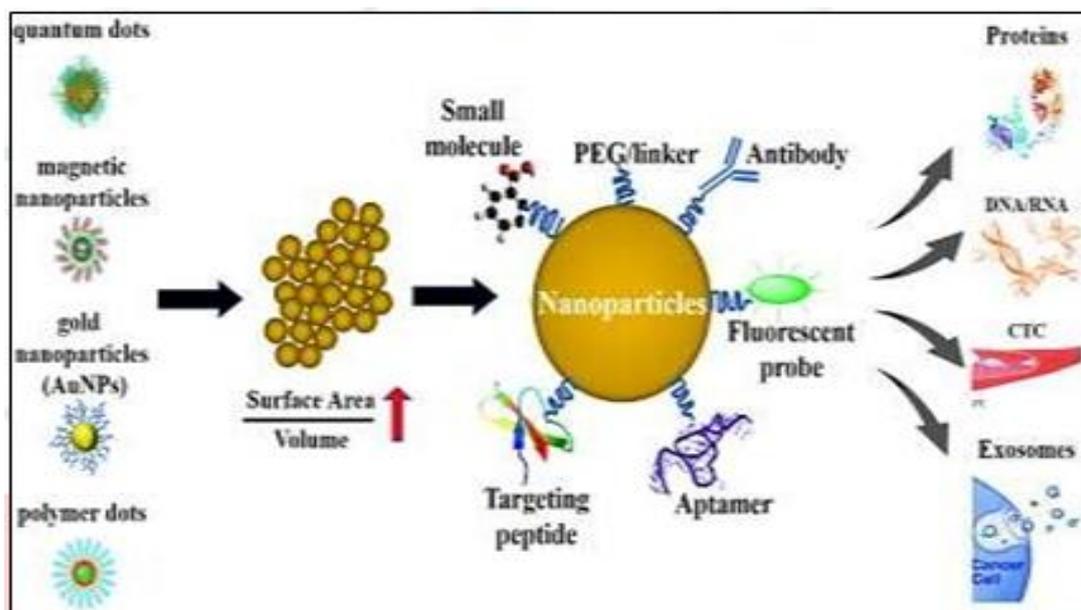


**Fig 2: Anti-Cancer Drug Delivery**

**C. Cancer Treatment Using Nanotechnology :**

Nanotechnology can be used for curing cancerous cells as well as in the identification of cancerous cells. Nanotechnology can provide rapid and sensitive detection of cancer-related molecules, enabling scientists to detect molecular changes even when they occur only in a small percentage of cells and even when the molecular change is

very small. Nano cells can also be implanted in a person body's affected part due to cancer where it will multiply very quickly resulting in regeneration of new cells .It is very effective in case of cancerous tissue where chemo therapy is not very effective. Nanoparticles are injected directly into the cancerous part.

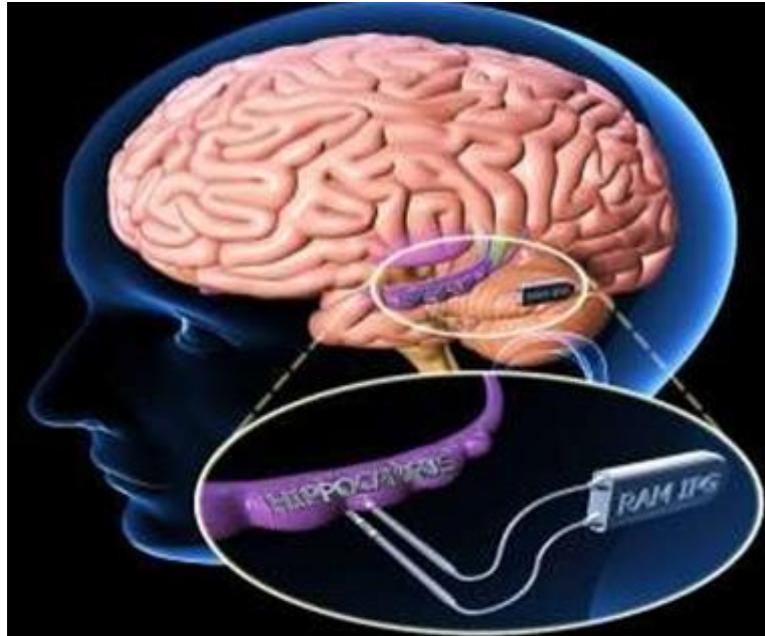


**Fig 3: GNPs Antibody Conjugation in Chemotherapy**

*D. Uses of Nanotechnology in Neurology to Study Human Nervous System :*

Nanotechnology can be used to cure the affected nerve cells. Nanotechnology is implemented in the study of human nervous system to study the abnormalities in the affected

nerve cells, their characteristics, their deformities. Then nanomaterials can be used to cure those abnormal nerve cells. Nanomaterials contribute greatly to therapeutic strategies including drug delivery, neuroprotection, neural regeneration, neuroimaging and neurosurgery.

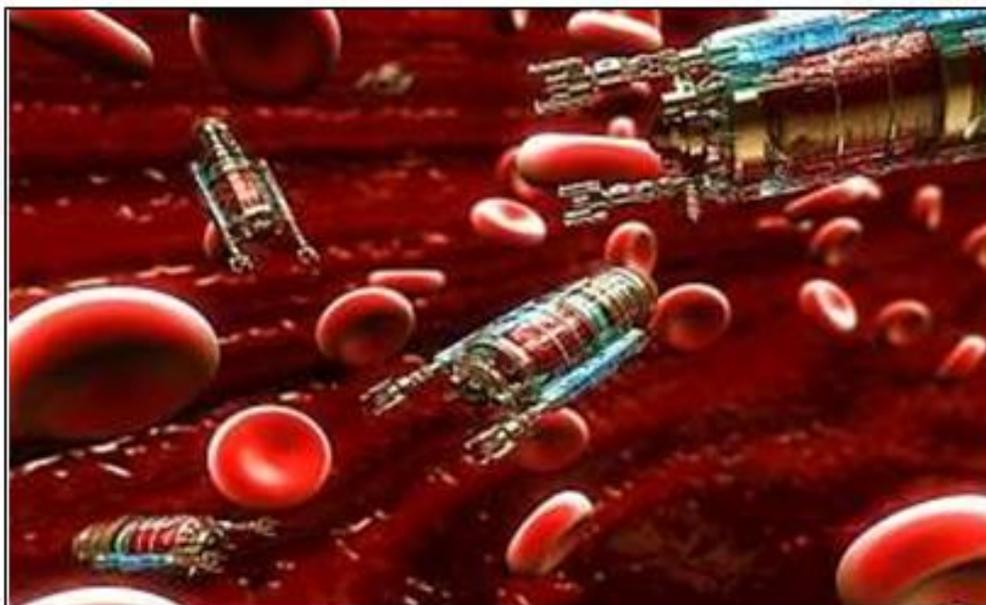


**Fig 4 :** Nano Brain Implantation using Graphene Chip

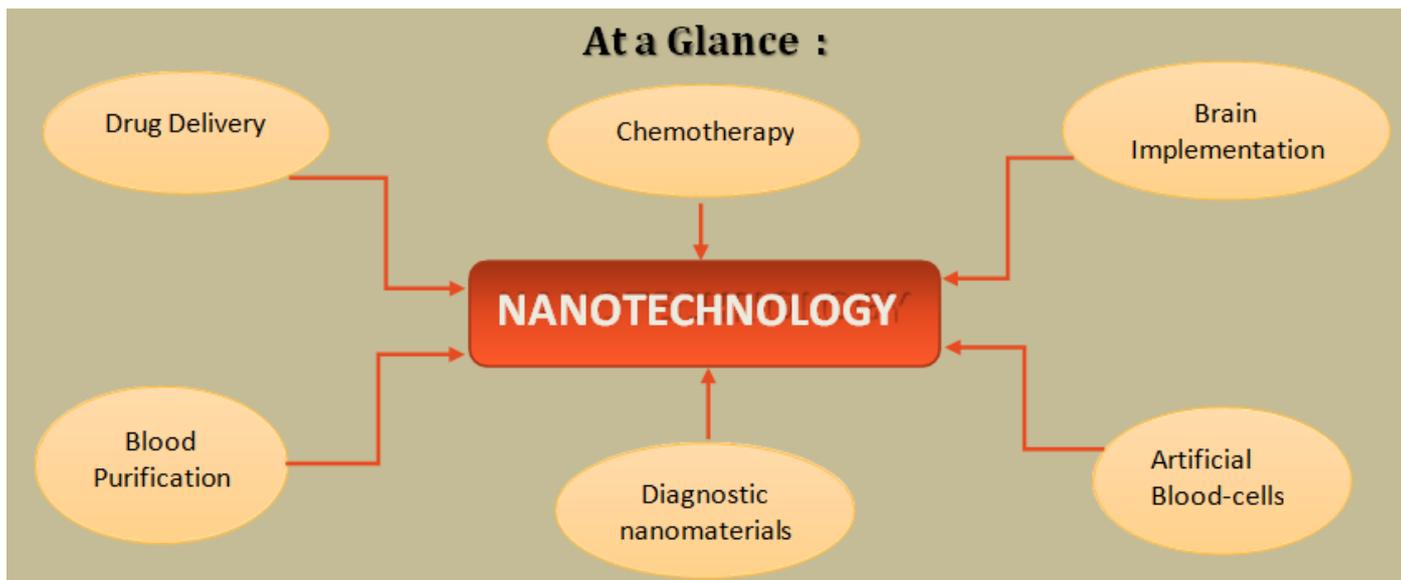
*E. Uses of Nanotechnology to Treat Blood Disorder Diseases (BDDs) :*

Nanobots can be used to treat thalassemic or hemophilic patients. Specific Nanobots are designed which are analogous to RBCs are implanted into the patient's body which multiplies rapidly and hence regenerate RBCs and increases its count in the body thus expanding the life of the

patient. Bone marrow transplantation and stem cells therapy have been used to treat BDDs but cure rates are low due to unavailability of the right type of bone marrow and the likelihood of recurrence and infection. With the rapid development of Nanotechnology in the field of biomedicine, artificial blood or blood substitute has shown promising features for the emergency treatment of BDDs.



**Fig 5 :** BDDs Fighting Nanobots in blood vessels



### III. CONCLUSION

This paper describes that Nanotechnology has important implications in nearly all the branches of medicine and it has all the capabilities to revolutionize the vast field of medicine in future. Nano cells can also be implemented to cure and regenerate lung cells (affected due to smoking) or other part's cells or to recover lost body parts due to accidents.

Nanomaterials can be applied to heal spinal cord injuries. Nanomaterials can be injected into the blood stream which can prevent the damage caused by inflammation and scarring. Tissue nano transfection (TNT) procedure is another very important application of nanotechnology. It helps not only in repairing damaged tissues but also restoring function to aging tissues. TNT uses a small nanochip delivery device to reprogram skin cells to form other types of cells that can then be used to repair or restore function to nerves, blood vessels, organs and other types of damaged tissue.

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