



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 8, August 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 7.569**

9940 572 462

6381 907 438

[ijirset@gmail.com](mailto:ijirset@gmail.com)

[www.ijirset.com](http://www.ijirset.com)



# Nanotechnology – a Non Invasive Approach to Cancer Detection, Diagnosis and Treatment

V.Sai Prashanthi<sup>1</sup>, W. Jaya Selva Vinitha<sup>2</sup>,

Lecturer, Department of Physics & Electronics, St. Ann's College for Women, Mehdiapatnam, Hyderabad,  
Telangana, India

Lecturer, Department of Physics & Electronics, St. Ann's College for Women, Mehdiapatnam, Hyderabad,  
Telangana, India

**ABSTRACT:** According to reports from India Today, India ranks third in cancer cases after China and US. Every year India reports more than a million new cancer cases. Cancer, an abnormal growth of cells, is of more than hundred types. Chemotherapy, radiation or surgery, are well known treatments for Cancer. Anemia, Appetite loss, Fatigue, Hair loss, Nausea, Vomiting etc is side effects of cancer. These side effects are when cancer treatment affects healthy tissues and organs, due to the invasive nature of these treatments. New approaches for Cancer prevention, diagnosis and treatment are the need of the hour. Nanoparticles can selectively target cancer cells, hence causing minimum amount of healthy tissue destruction and causes destruction of only cancer cells. Hence where conventional methods fail or face difficulties in detection, diagnosis and treatment of cancer, Nanotechnology holds great potential. Nanoshells, Carbon nanotubes, quantum dots, polymeric quantum nanotubes, nanosponges etc are developed to be used in prevention, diagnosis and treatment of cancer. This review discusses different Nanomaterials used, cases where Nanomaterials/Nanotechnology is used for the treatment of cancer, and also the latest research in this field.

**KEYWORDS:** Cancer, Nanotechnology, conventional, Nanomaterials

## I. INTRODUCTION

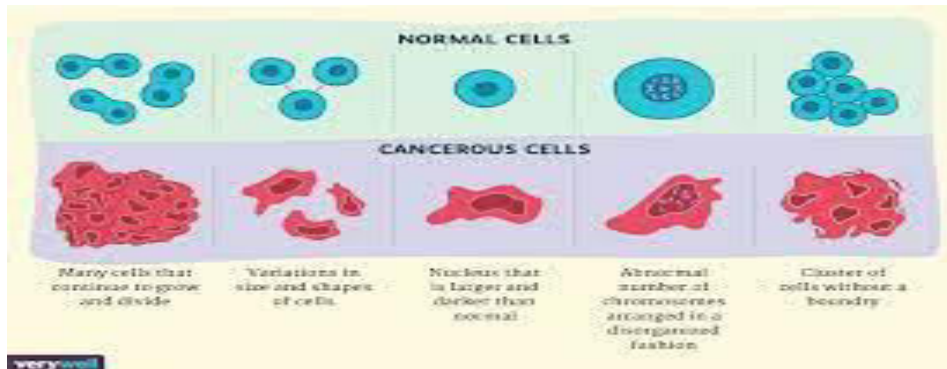
Nanotechnology deals with materials which consists of molecules and atoms in the nano size range ( $10^{-9}$ ). It is the study of extremely small things. It is a Multidisciplinary field in which the techniques of Biology, Chemistry and Medicine are used to achieve the objective. "There's plenty of room at the bottom", a talk given by physicist Richard Feynman at an American Physical Society Meeting held at CalTech on Dec 29, 1959 is when it all began. All matter is made up of atoms and molecules. Nanotechnology is the ability to control the atoms and molecules with the right tools.

## II. LITERATURE SURVEY

### Cancer-

Growth of a tissue after the development of certain number of cells will be stopped. In cancerous cells the tissue grows abnormally. Cancer is a genetical disease which is of two types. In the first type of cancer, the cells will be permanently enabled due to genetic disorder and in the second type of cancer, the cancer cells will be permanently disabled. Because of the uncontrolled cell division and release of chemicals by cells, an abnormal growth arises known as malignant tumor. Because of this malignant tumor, Metastasis Phenomenon occurs as a result of which the cells enter the blood and tumors will be formed in other parts of the body.

Cancer controls the growth and division of cell which damages the genes. There by hormone like molecule is produced which supplies the oxygen to the blood vessels to grow towards the cell. The size of the cell will be in the order of micrometer. Nano particles can enter this cell and they can detect the molecular changes in cells. Hence nanotechnology can be used for the detection and treatment of cancer.



**Detection of Cancer-**

Cancer is detected by using conventional method and Nanotechnology method.

**Conventional method-**

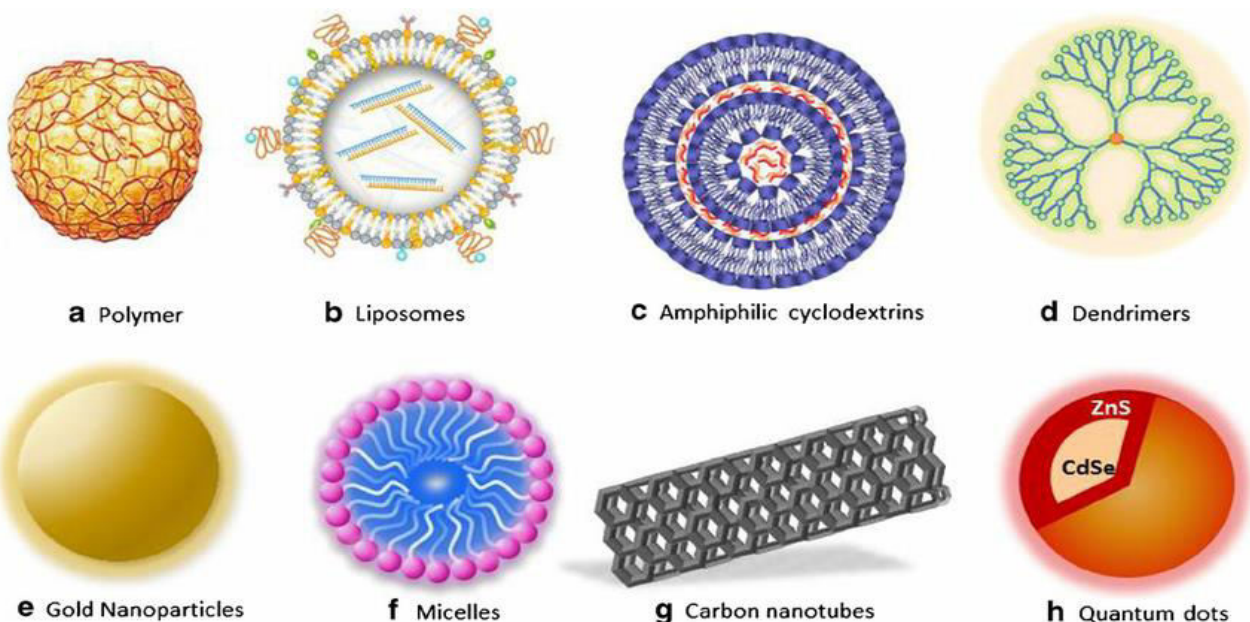
In the conventional method the cancer is detected after observing the physical growth of affected organ by using X-ray and CT scans of particular infected organ. By using Conventional method we can detect cancer in advanced stage after the substantial growth of cancerous cells. In this method in the first type of treatment the part infected with cancer is removed by surgery and the patient loses that particular organ and the cancer may spread to other parts of the body. Second type of treatment given to patient is Radiation therapy. In this, the affected part of the patient will be exposed to high intensity radiation but the nearby healthy cells will get damaged due to high intensity radiations.

**Nanotechnology method-**

The cancerous cells are in the order of few microns so nanoparticles which are of the order of  $10^{-9}$  microns can easily enter the cancerous cells and they will access the genes and identify the defect associated with genes. Using nanotechnology method, cancer can be detected at an early stage.

**Treatment of Cancer**

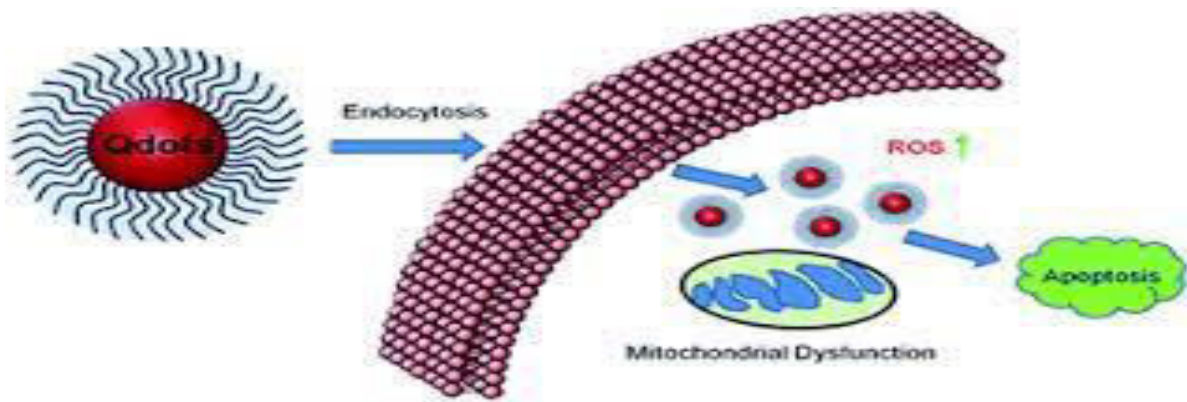
In the treatment of cancer, the nanoparticles like Quantum dots, Carbon nano tubes are used because of their Fluorescence and optical imaging capability.





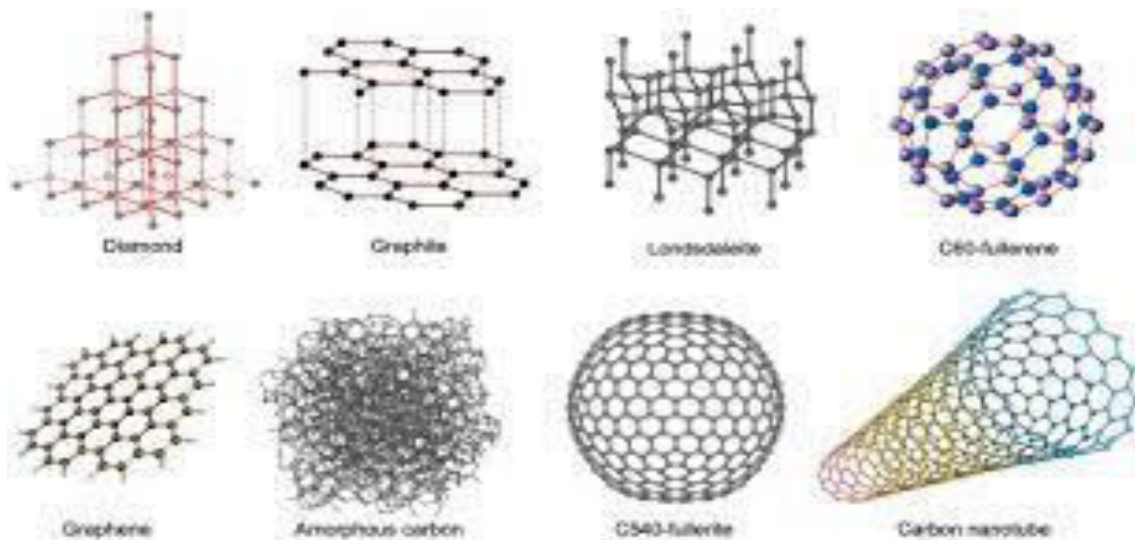
**Quantum Dots-**

Detection of cancer at the early stage is more desirable especially in the case of breast cancer, cervical cancer and prostate cancer. In most of these cases it is observed that the tumor of cancer will be detected once it reaches 1 cm in diameter. The treatments used in the treatment of cancer are biopsy, xray, MRI scan. It was observed that even after detecting cancer cells, there were no reliable tests to detect the severity of the disease. And until the severity of cancer is detected no medicine can be administered to cure it. In such a case, in order to overcome the problem nanoparticles Quantum dots were introduced. Quantum dots are luminescent semiconductor nanocrystals. The quantum dots are generally made of group II & IV, group III & V elements. The size of quantum dots are in the range of nanometer and because of this range the quantum dots behave like a potential well. Quantum dots are used in the field of oncology because of their optical properties, high brightness, long term stability and multiple signal detection. These fluorescent nanoparticle colloids were used to detect the tissue biopsies, medical imaging and small size tumors. Because of fluorescent light emission and multiplexing technologies the Biconjugated quantum dots are used in cancer treatment.



**Carbon Nano Tubes**

The common treatments used for cure of cancer is chemotherapy, surgical intervention and radiation therapy. The most common side effects of such treatments are hair loss, nausea, infertility, neurotoxicity and the destruction of normal cells which are in the close proximity to the cancerous cells. In order to overcome this problem the biological nanoparticles like carbon nanotubes are used for the treatment of cancer. Carbon nanotube is a nanoneedle shaped hollow monolithic structure and because of its shape it allows the material to enter the cell and to get attached to the surface of the cell. Because of this ability, CNT is used as a drug carrier. This is one of the major applications of CNT. Carbon nano tube is considered as a very important nanomaterial in the field of biomedical applications.





### III. CONCLUSION

Nanotechnology provides a rapid detection of cancerous cells even when they are small in number, thus enabling doctors to administer medicines and treatment to the affected patients in the initial stages of cancer which could be life saving. The treatment of cancer through Nanotechnology is also non-invasive and tumor targeting, thus affecting non cancerous tissues to the minimum.

### REFERENCES

- [1]<https://pubs.rsc.org/en/content/articlelanding/2016/ra/c6ra24063a>
- [2]<https://link.springer.com/article/10.1007/s41061-019-0278-8>
- [3]<https://www.verywellhealth.com/cancer-cells-vs-normal-cells-2248794>
- [4][https://www.researchgate.net/figure/Different-types-of-nanoparticles-commonly-used-for-biomedical-applications-and-which\\_fig2\\_269182214](https://www.researchgate.net/figure/Different-types-of-nanoparticles-commonly-used-for-biomedical-applications-and-which_fig2_269182214)
- [5][\(PDF\) Nanoparticles in Cancer \(researchgate.net\)](#)
- [6][Impact of nanotechnology in cancer: emphasis on nanochemoprevention \(nih.gov\)](#)
- [7] [http://trl.lab.uic.edu/1.OnlineMaterials/nano.publications/Cancer\\_Nanotechnology.pdf](http://trl.lab.uic.edu/1.OnlineMaterials/nano.publications/Cancer_Nanotechnology.pdf)
- [8]<http://www.ajesjournal.com/PDFs/08-2/4.%20Nanotechnology%20and%20Cancer%20Treatment.pdf>
- [9] <http://faculty.washington.edu/xgao/Images/MDcancer.pdf>



**Impact Factor:  
7.569**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details