

## CANCER NANOTECHNOLOGY

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**Abstract** - At present there are wide varieties of technologies, which are vastly being used to examine organic cells to detect diseases and develop methods to cure diseases. One such technology is 'Nanotechnology'. A nanometer is a one thousand-millionth of a meter. It is hard to visualize everything so small, but consider of approximately only 1/80,000 the size of a human hair. Ten hydrogen atoms might be placed side-by-side in a particular nanometer. This nanotechnology is the creation of valuable resources, devices, and systems through the management of matter on this minute scale. The developing field of nanotechnology includes researchers from many different sources, containing chemists, physicists, engineers, and naturalists. "Nanotechnology will change the very fundamentals of cancer analysis, handling, and prevention". Nano measure plans used for treatment of cancer are based on the continuous study of cancer cells and nanotechnology. Nano scale plans which are smaller than 50 nanometers can effortlessly enter most cells, while those smaller than 20 nanometers can travel out of blood containers as they mingle through the body. Because of their minor size, nano scale devices can eagerly interact with biomolecules on both the external of cells and inside of cells. By gaining access to so many parts of the body, they have the possible to identify disease and deliver action in ways unimagined earlier now. Innovative organic processes that lead towards cancer arise at the nano scale at and inside cells, nanotechnology deals a wealth of tackles with fresh and innovative methods to detect and treat cancer.

In this paper we outline a plan that spreads sensors, handsets, engines and a processor, which are done up of decomposable compound. No more obliteration of sound cells because of unsafe poisons and pollutions produced through chemotherapy and tainting treatment.



.... Going small for big Advances

**Key Words:** Cancer, Nano device, RF Heating, Cantilevers, DNA

### 1. Introduction

The paper manages the annihilation of tumor cells by giving a proficient strategy for wrecking and curing the growth with the goal that sound cells are not influenced at all. This innovation additionally concentrates on a fundamental thought that the patient is not influenced by tumor once more. The determination of utilizing the RF flag is to spare ordinary cells.

### Nanotechnology

Nanotechnology refers to the communications of cellular and molecular components and planned materials at the most primary level of biology. It highlights on the effective utilization of Nanotechnology in the treatment of cancer.

### What is Cancer?

Cancer cells are different from healthy cells because they divide more quickly than strong cells. In addition, when cells split at a faster rate, they form a mass of tissue called a tumor. These cancerous cells that come in excess amounts cause many problems to the bodies of patients.

In general, the most common methods used for the cancer treatment are

- i. Chemotherapy, a treatment with powerful medicines
- ii. Radiation, a treatment given through external high-energy rays.

### 2. Problem

Both the treatments mentioned above are harmful. Healthy cells are destroyed in the process. As a result, this leaves the patient very weak, causing him not able to recover quickly to medical treatments. It has been proved that any individual who had cancer can survive on deadly chemotherapy up to a maximum of five years and after that it's anybody's guess.

### 3. Proposed Solution

The nano gadgets can be wanted to decimate influenced cells and obliterate just them, along these lines finishing up the

troublesome of annihilating any for the most part running cells which are important to one's prosperity. Hence the treatment utilizing nanotechnology will make the influenced man flawlessly ordinary.

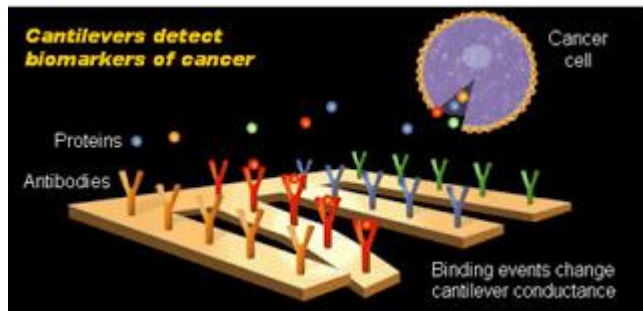
"Noninvasive access to the inside of a living cell manages the open door for remarkable picks up on both clinical and fundamental research boondocks".

#### 4. Nanotechnology and Diagnostics

Nano devices can offer quick and sensitive discovery of cancer-related molecules through assisting experts to detect molecular alterations even when they occur only in a minor percentage of cells.

##### Cantilevers

Nano scale cantilevers - minute, versatile beams moving toward a column of plunging boards - are worked by semiconductor lithographic strategies. These can be secured with atoms proficient of restricting particular substrates-DNA reciprocal to a particular quality succession, for instance. Such micron-sized gadgets, including numerous nanometer sized cantilevers, can recognize single particles of DNA or protein.



As a cancer cell hides its molecular products, the antibodies covered on the cantilever portions selectively bind to these secreted proteins. These antibodies have been intended to get at least one unique, particular atomic articulations from a disease cell. The physical resources of the cantilevers change because of the vital occasion. This variety continuously can offer not just realities about the nearness and the nonattendance yet additionally the contemplation of various atomic terms. Nano scale cantilevers consequently can offer speedy and touchy recognition of malignancy related atoms.

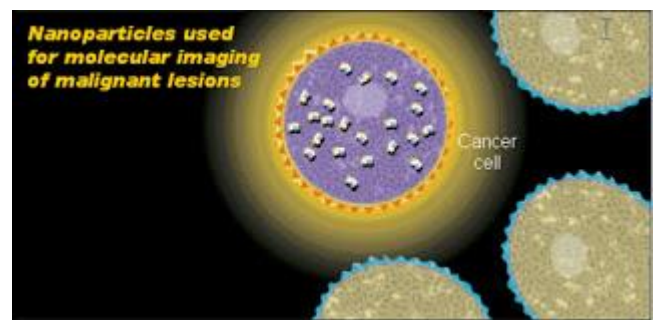
#### 5. Nanotechnology and Cancer Therapy

Nano scale devices have the possible to fundamentally change cancer therapy for the healthier and to naturally increase the quantity of highly effective therapeutic agents. Nano scale ideas, for instance, should help as adjustable, directed medication conveyance vehicles fit for shipping expansive dosages of chemotherapeutic operators or remedial qualities

into harmful cells while saving solid cells, which would imperatively decrease or evacuate the frequently unpalatable reactions that go with many present tumor treatments.

##### Nano particles

Nano scale devices have the possible to fundamentally change cancer therapy for the healthier and to dramatically increase the quantity of highly effective therapeutic agents. In this example, nano particles are targeted to cancer cells for use in the molecular imaging of a malignant lesion. Huge amounts of nano particles are carefully inserted into the body and specially bind to the cancer cell, defining the functional contour of the lesion and making it visible.



These nano particles offer us the capability to see cells and molecules that we otherwise cannot discover through conventional imaging. The capacity to pick up what occurs in the cell - to monitor therapeutic intervention and to see when a cancer cell is mortally wounded or is actually activated is critical to the successful diagnosis and treatment of the disease.

Nano particles technology can prove to be very beneficial in cancer therapy permitting for effective and targeted remedy delivery by overcoming the many biological, biophysical and biomedical barriers that the body stages against a standard intervention such as the administration of drugs or contrast agents.

#### 6. Working Procedure

The underlying stride of recognizing the malignancy and the position should be possible by checking. After the position has been perceived through checking, the errand is to put the nano gadget to the correct position. We concentrate on the setting of the nano gadget into the required position without anyone else's input. The nano gadget is allowed to be set into any piece of the body or the nano gadget is embedded through the vein. The situating is finished with the assistance of numerical figuring. Outside Control signs could be utilized to maintain a strategic distance from debacle or whatever other errors. The nano device is overloaded with a microchip. The device is also delivered with the composites covered so that it is originated externally through a computer. The nano

device contains sensors, motor, gene reader, processor, transceiver, camera and power supply. The place of the cancer cells is given as coordinates in a 3-dimensional point of view. This point is considered as the reference and referred as (0, 0, and 0).

### a. Positioning

The nano gadget plays out an inner estimation in light of the distinction between its present position and the reference. Logical computations incorporate to such a degree, to the point that only a solitary rotate is taken a gander at between the nano device and the reference on the double. The motor fan is arranged particularly for a particular situation examination. After one of the hubs is finished and correlation is done, at that point the following hub is being looked at taken after by the third. Hence the three co-ordinate correlation of the nano gadget brings about any 3-Dimensional introduction of the nano gadget and results in correct situating.

### b. Navigation

The output of the mathematical operation is given to a driver circuit (motor). The driver helps the device to navigate through the blood with precision in direction and with the required speed. The device thus should sample its new position with the reference at a sampling rate. The sampling rate is made such that their value is less than the velocity of blood flow.

The cancer destroyer could thus fix that it was placed in (say) the big toe. If the objective were to kill a colon cancer, the cancer destroyer in the big toe would move to the colon and destroy the cancer cells. Very precise control over position of the cancer destroyer's activities could thus be realized. The cancer killer could readily be reprogrammed to attack different targets using acoustic signals while it was in the body.

### Algorithm for Navigation

- Step 1: Marks the co-ordinates.
- Step 2: Prepare the start command.
- Step 3: Feed the axis.
- Step 4: Send command to emit ultrasound.
- Step 5: Wait for T seconds.
- Step 6: If there is no signal reproduced back (or) if the reproduced signal is less than the threshold value, then motivates the stepper motor to rotate through a certain distance. (Note: the distance is proportional to one axis)
- Step 7: Deduct the axis value by one.
- Step 8: Continue from step 4 to step 7 for both co-ordinates.
- Step 9: If the signal reflected back is greater than the threshold value then the motor is deactivated.
- Step 10: The motor (perpendicular to motor 1) is activated. The motor 2 moves through one step thus making the

motor 1 to change the axis.

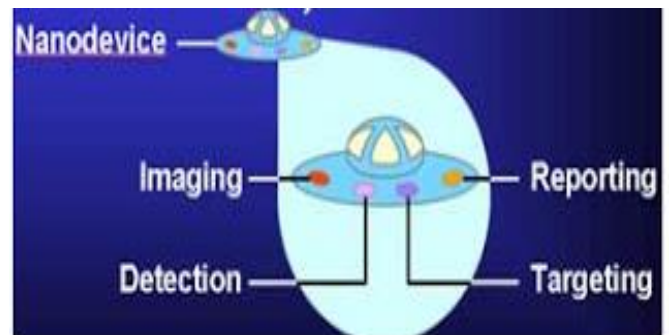
Step 11: The motor 1 is allowed to travel until next change is required.

Step 12: As soon as the nano device reaches the required spot, the motor is disengaged through external command.

Step 13: Receives the RF radiation for T seconds that has been as of now computed relying on the power of tumor.

### c. Imaging

With the available technology, a camera is inserted which helps us to monitor the internal process. At whatever point numerous bearings are there in the vein, the gadget is made to stop through the outer control flag and another flag is given to initiate the correct way. Present clinical ultrasound scanners form images by transferring pulses of ultrasonic energy along numerous beam lines in a scanning plane and identifying and exposing the succeeding echo signals. Our imaging is based on the absolute scattering properties and in the frequency dependence of scattering in tissues, which will help to distinguish between normal and abnormal cells.



### d. Identification

The Nano device recognizes the cancer cells using a gene reader. A gene reader is a sensor which comprises ten to fifty DNA probes or samples of cancer cells that are complementary. The DNA discovery system produces an electronic signal whenever a DNA match arises or when a virus producing cancer is present. At whatever point we get a flag showing the nearness of disease cells we go for additionally process. After the gadget has been at first situated, the following stage is the decimation of the disease cells.

### e. Destruction

We can slightly control the actions of DNA using RF energy. An electronic boundary to the biomolecule (DNA) can be formed. RF magnetic field should be inductively coupled to nano crystal antenna linked covalently to a DNA molecule. The inductive coupling results to the increase in the local temperature of the bound DNA, allowing the change of state to take place, while leaving molecules surrounding the DNA relatively unaffected. The switching is fully reversible, as

dissolved molecules dissipate the heat in less time duration. Thus RF signal generated outside the body can destroy the affected DNA.

#### **f. RF Heating**

The treatment tip comprises the necessary technology mechanisms that transform RF to a volumetric tissue heating basis. The heat delivery surface transmits RF energy to the cells. Tumors that have practically zero oxygen content (i.e. hypoxia) likewise have expanded imperviousness to radio recurrence radiation. Along these lines, because of awesome imperviousness to radio recurrence defilement the influenced cells get warmed and in this manner harmed. The RF bearer recurrence is in the biomedical range (174 MHz – 216 MHz). A pair of RF pulses is transmitted at a frequency of about 1-2Hz.

#### **7. How Nano device escapes from immune system?**

Generally our safe framework assaults all the outside particles arriving any piece of our body. The issue has been that such nano particles are comparative in size to infections and microscopic organisms, and the body has grown extremely effective components to manage these trespassers. It is outstanding that microscopic organisms with hydrophilic exterior can abstain from being harmed by insusceptible framework and remain blending in the body for lengthier periods. To copy this impact, our Nano gadget can be covered with a polymer, for example, polyethylene glycol (PEG), which is demonstrated after the examination.

#### **8. Conclusion**

According to the point we have arranged the use of nanotechnology and the RF motion for the devastation of tumor cells. This procedure doesn't influence the sound cells with the end goal that the tumor influenced individual is solid after the treatment. This treatment doesn't include basic operations. This treatment won't take longer time as in some other medicines. Most likely one day or the other malignancy safeguarded patient will be influenced again in medications other than nanotechnology treatment. This can be exceptionally very much utilized for other hazardous infections.

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