

NANOTECHNOLOGY APPROACH FOR CANCER THERAPY

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Abstract - Cancer is the present leading cause of death in worldwide, about 7.6 million peoples die due to cancer. There are many ways to treat cancer, but it is not effective. We need to have an efficient way to reduce the spread of cancer. Nanotechnology help to reduce, prevent and detect cancer. Nanotechnology is the study, manipulation and manufacture of small device or machine. The use of nanotechnology in cancer treatment offers some exciting possibilities, including the possibility of destroying cancer tumors with minimal damage to healthy tissue and organs, as well as the detection and elimination of cancer cells before they form tumors. The future of technology at times becomes easy to predict, but computers will compute faster, materials will become stronger and medicine will cure more diseases. The technology that works at the nanometer scale of molecules, enabling great improvements in all the fields of human presence. A variety of medical processes occur at nanometer length scales which is useful. Among the approaches for exploiting developments in nanotechnology in medicine, nanoparticles offer some unique advantages as sensing, delivery, and image enhancement agents. Several varieties of nanoparticles are available to treat many diseases including, gold nanoparticles, Nano robot etc. gold nanoparticles as ultrasensitive fluorescent probes to detect cancer biomarkers in human blood. The approach is so sensitive, and could also be employed in direct detection of viral or bacterial DNA. The nanorobotics as a wonderful vision of medicine in the future which could carry and deliver large amounts of anti-cancer drugs into cancerous cells without harming healthy cells, reducing the side effects related to current therapies like damage of the conventional chemotherapy. This paper presents a study on different approaches employed towards cancer treatments. Further, it also provides an insight into the future scope in this field of study.

Keywords-Gold nanoparticles, nanorobots, Nano-sensors

1. INTRODUCTION

Nanotechnology is about building machines at the molecular level. Machines are so small that they can travel through your blood stream. It offers promise for the targeted delivery of drugs, genes and protein to tumor tissue and therefore alleviating the toxicity of anticancer agent in health tissues.

Two approach used to detect cancer are gold nanoparticles and Nano robots. These two technologies are better than chemotherapy, radiation therapy because these are non-toxic and can detect cancer in their early stages.

2. GOLD NANOPARTICLE

Gold nanoparticles occur as clusters of gold atoms up to 100nm in diameter. Nano gold has unusual visible properties because the particles are small enough to scatter visible light -in contrast, mass gold reflects light. It appear yellow to deep red in solution it also depend on size of nanoparticle. It plays an multifunctional role in image and diagnose diseases, deliver of chemical agents and also administer electromagnetic radiation to disease site.

3. WORKING

Gold nanoparticle are heated up by radio frequency(RF).[1]Since Gold is a very good heat-conductor ,so the heated nanoparticle would in turn heat the cancer cell up which would destroy the cancer cell . These radio waves would not harm healthy cells. Infrared light waves can be used in place of radio waves to heat up the cancer cells for destruction. The advantage of Gold nanoparticle is that they can easily detect cancerous cell, good in scattering and absorbing light, nontoxic and do not affect any of the healthy cells. This therapy will work on any soft-tissue tumors, such as the breast, prostate, brain, skin, etc. But they have some disadvantages like when heat is applied it may affect healthy cells also.

4. NANOROBOTS

Nano robots is the emerging technology field creating machines or robots whose components are at or close to the scale of nanometers (10⁻⁹ meters).Nano robotics refers to the nanotechnology engineering discipline of designing and building nano robots, with devices ranging in size from 0.1–10 micrometers and constructed of nanoscale or molecular components .It could transport and deliver chemical agents directly to a target cell. Nano killer could find and repair damaged organs, detect and destroy a tumor mass. [4]They would tell you how many cancer cells they have encountered and inactivated .Respirocytes identify tumors and then allow the nanokiller to kill cancerous cells. It would not only find cancers in their earliest stages before they can do damage , but also deliver a small amount of a drug targeted directly at tumors ,which would cause little or no side effects.

5. DESIGN OF NANOROBOT

There are three main considerations need to focus on designing a nanorobot to move through the body- navigation, power and how the nanorobot will move through blood streams. For directing the nanorobots to the cancerous cells we can make use of ultrasonic signals which are emitted by the nanorobot. These ultrasonic waves are detected by ultrasonic sensors. Components of nanorobots include sensors, control system, power unit, propeller, driller and arm. Nano sensors can be any biological, chemical, or surgical sensory points used to convey information about nanoparticles to the macroscopic world. Medicinal uses of nanosensors mainly revolve around the potential of nanosensors to accurately identify particular cells or places in the body in need. By measuring changes in volume, concentration, displacement, speed, velocity, gravitational, electrical and magnetic forces, pressure, or temperature of cells in a body, nanosensors may be able to distinguish between and recognize certain cells. They use the patient's body heat to create power, but there would need to be a gradient of temperatures to manage it. Propeller is used to drive nanorobot forward and backward.

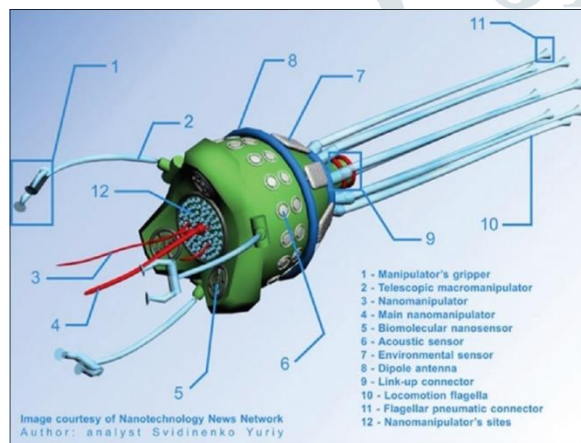


Fig 1: design of nanorobotics

6. COMPARING TWO APPROACH

Comparison of two approach is done based on appearance, usage, application, advantage and disadvantages. Both gold nanoparticle and nanorobot have nano size. Nanoparticle will bind the cancer cell and it is heated by radio waves which in turn destroy cancerous cell while nanorobot first it is injected to the body and it deliver chemical agent which destroy cancerous cell without harming normal cells. Nanoparticle applicable for oncology, neurology, and cardiology while nanorobot mainly applicable for oncology. Advantage of both approach is can easily detect and destroy cancerous cell. Disadvantage of gold nanoparticle is that it release heat which effect healthy cell. So nanorobot is best approach to treat cancer because it does not affect normal cell and it can completely destroy cancer cell in early stage.

criteria	gold nanoparticle	Nanorobot
Appearance	Blue or red	100 times smaller than human tissue
usage	They are injected and	Nanorobot with

	then heated by radio wave	Biosensors are used to detect
application	Oncology, neurology, cardiology etc.	Mainly for oncology
advantage	Can easily detect, good in scattering and absorbing light	Detect in early stages, No side effect
disadvantage	Releases heat which effect healthy cells.	Cluster of different Nano robots with one another is harmful.

Table 1 : Comparison between two approaches

7. CONCLUSION

Nanotechnology can play an intimate role in medical. It increase the affinity of the nanoparticle for detecting cancerous cell. It also help to prevent, detect and destroy cancerous cell. As we can see number of deaths increasing because of cancer we need to take appropriate measures to reduce the diseases. The best approach is to implement nanorobot which is nontoxic and do not affect the cancerous cell. Comparing the gold nanoparticle and nanorobot, nanorobot has less disadvantage and more efficient for treating cancer safely.

8. REFERENCES

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