Cancer nanotechnology

Technology

Going small for big Advances Abstract At present there are wide varieties of Technologies, which are vastly being used to analyze biological cells to diagnose diseases and develop methodologies to cure diseases. One such technology is 'Nanotechnology. A nanometer is a billionth of a meter. It's difficult to imagine anything so small, but think of something only 1/80, 000 the width of a human hair. Ten hydrogen atoms could be laid side-by-side in a single nanometer. Nanotechnology is the creation of useful materials, devices, and systems through the manipulation of matter on this miniscule scale.

The emerging field of nanotechnology involves scientists from many different disciplines, including physicists, chemists, engineers, and biologists. " Nanotechnology will change the very foundations of cancer diagnosis, treatment, and prevention. " Annoyance devices used for treatment of Cancer are based on the constant study of cancer cells and nanotechnology. Annoyance devices which are smaller than 50 manometers can easily enter most cells, while those smaller than 20 manometers can move out of blood vessels as they circulate through the body.

Because of their small size, annoyance devices can readily interact tit bimolecular on both the surface of cells and inside of cells. By gaining access to so many areas of the body, they have the potential to detect disease and deliver treatment in ways unimagined before now. Since biological processes that lead to cancer occur at the annoyance at and inside cells, nanotechnology offers a wealth of tools with new and innovative ways to diagnose and treat cancer. In our paper we design a device that contains sensors, transceivers, motors and a processor, which are made up of biodegradable compound.

No more destruction of healthy cells due to harmful toxins and radiations generated through chemotherapy ND radiation therapy. Introduction The paper deals with the eradication of cancer cells by providing an efficient method of destroying and curing the cancer so that healthy cells are not affected in any manner. This technology also focuses on a main idea that the patient is not affected by cancer again. The purpose of using the REF signal is to save normal cells. Nanotechnology in this context Nanotechnology refers to the interactions of cellular and molecular components and engineered materials at the most elemental level of biology.

This paper emphasizes 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 rapidly than healthy cells. In addition, when cells divide at an accelerated 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 ; Chemotherapy, a treatment with powerful medicines ; Radiation therapy, a treatment given through external high-energy rays.

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 guess. Proposed solution The indecisive can be programmed to destroy affected cells and kill only them, thus ending the problem of destroying any normally functioning cells which are essential to one's well-being.

Thus the treatment-using nanotechnology will make the affected man perfectly normal. " Noninvasive access to the interior of a living cell affords the opportunity for unprecedented gains on both clinical and basic research frontiers. " Nanotechnology and diagnostics Indecisive can provide rapid and sensitive detection of cancer-related molecules by enabling scientists to detect molecular changes even when they occur only in a small percentage of cells. Cantilevers Annoyance cantilevers - microscopic, flexible beams resembling a row of diving boards - are built using semiconductor lithographic techniques.

These can be coated with molecules capable of binding specific substrates-DNA complementary to a specific gene sequence, for example. Such micron-sized devices, comprising many nanometer-sized cantilevers, can detect single molecules of DNA or protein. As a cancer cell secretes its molecular products, the antibodies coated on the cantilever fingers selectively bind to these secreted proteins. These antibodies have been designed to pick up one or more different, specific molecular expressions from a cancer cell.

The physical properties of the cantilevers change as a result of the binding event. This change in real time can provide not only information about the presence and the absence but also the concentration of different molecular expressions. Annoyance cantilevers, thus can provide rapid and sensitive detection of cancer-related molecules. Nanotechnology and Cancer therapy

Annoyance devices have the potential to radically change cancer therapy for the better and to dramatically increase the number of highly effective therapeutic agents.

Annoyance constructs, for example, should serve as customizable, targeted drug delivery vehicles capable of ferrying large doses of chemotherapeutic agents or therapeutic genes into malignant cells while sparing healthy cells, which would greatly reduce or eliminate the often unpalatable side effects that accompany many rent cancer therapies. Inappropriate agents. In this example, inappropriate are targeted to cancer cells for use in the molecular imaging of a malignant lesion.

Large numbers of inappropriate are safely injected into the body and preferentially bind to the cancer cell, defining the anatomical contour of the lesion and making it visible. These inappropriate give us the ability to see cells and molecules that we otherwise cannot detect through conventional imaging. The ability to pick up what happens 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.

Unpredictable technology can prove to be very useful in cancer therapy allowing for effective and targeted drug 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. Working procedure: The initial step of identifying the cancer and the location can be done by scanning. Once the location has been identified through scanning, the task is to position the annotative to the exact location.

We focus on the positioning of the annotative into the required location by itself. The annotative is allowed to be placed into any part of the body (or) the Anna device is injected through the blood vessel. The positioning is done with the help of mathematical calculations. External Control signals could be used to avoid mishap or any other errors. The annotative is loaded with a microchip. The device is also provided with the compounds concealed so that it is initiated externally through a computer.

The Anna device contains sensors, motor, gene reader, processor, transceiver, camera and power supply. The location 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 Positioning The annotative performs an internal calculation based on the difference between its current position and the reference. Mathematical computations involve such that only one axis is compared between the Anna device and the reference at a time. The motor fan is placed in a particular direction for a particular reference comparison.

After one of the axis is completed and comparison is done, then the next axis is being compared followed by the third. Thus the three co-ordinate comparison of the Anna-device results in any 3- Dimensional orientation of the Anna-device and results in exact positioning. 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 killer could thus determine that it was located in (say) the big toe. If he objective were to kill a colon cancer, the cancer killer in the big toe would move to the colon and destroy the cancer cells. Very precise control over location of the cancer killer's activities could thus be achieved. The cancer killer could readily be reprogrammed to attack different targets using acoustic signals while it was in the body. Algorithm for navigation: Steel 1: Marking the co-ordinates.

Steps: Initialize the start command. Steps: Feed the axis. Steps: Send command to emit ultrasound. Steps: Wait for T seconds. Steps: If there is no signal reflected back (or) if the reflected signal is less than the horseshoed value, then activates the stepper motor to rotate through a certain distance. (Note: the distance is proportional to one axis) Steps: Subtract the axis value by one. Steps: Continue from steps to steps for both co-ordinates. Steps: If the signal reflected back is greater than the threshold value then the motor is De-activated.

Steeple: The motor (perpendicular to motor 1) is activated. The motors moves through one step thus making the motors to change the axis. Steeple: The motors is allowed to travel until next change is required. Steppe: Once the annotative reaches the required spot, the motor is deactivated through external nomad. Steppe: Receives the REF radiation for T seconds that has been already calculated depending upon the intensity of tumor Imaging With the available technology, a camera is inserted which helps us to monitor the internal process.

Whenever multiple directions are there in the blood vessel, the device is made to stop through the external control signal and another signal is given to activate in the right direction. Current clinical ultrasound scanners form images by transmitting pulses of ultrasonic energy along various beam lines in a scanning plane and detecting and displaying the subsequent echo signals. Our imaging is based on the absolute scattering properties and in the frequency dependence of scattering in tissues, which will help to differentiate between normal and abnormal cells.

Identification The Anna device identifies the cancer cells using a gene reader. A gene reader is a sensor which contains ten to fifty DNA probes or samples of cancer cells that are complementary. The DNA detection system generates an electronic signal whenever a DNA match occurs or when a virus causing cancer is present. Whenever we get a signal indicating the presence of cancer cells we go for further process. Once the device has been originally located, the next step is the destruction of the cancer cells. Destruction: We can remotely control the behavior of DNA using REF energy.

An electronic interface to the biomedical (DNA) can be created. REF magnetic field should be inductively coupled to nocturnal 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 sapient the heat in less time duration. Thus REF signal generated outside the body can destroy the affected DNA.

Ref heating The treatment tip contains the essential technology components that transform REF to a volumetric tissue heating source. The heat delivery surface transmits REF energy to the cells. Tumors that have little or no oxygen content (I. E. Hypoxia) also have increased resistance to radionuclide radiation. Thus, due to high resistance to radio frequency radiation the affected cells get heated and hence destroyed. The REF carrier frequency is in the biomedical range (174 - mezzo). A pair of REF pulses is transmitted at a frequency of about 1-GHz. How Anna device escapes from immune system?

Generally our immune system attacks all the foreign particles entering any part of our body. The problem has been that such Anna particles are similar in size to viruses and bacteria, and the body has developed very efficient mechanisms to deal with these invaders. It is known that bacteria with hydrophilic surfaces can avoid being destroyed by immune system and remain circulating in the body for longer periods. To emulate this effect, our Anna device can be coated with a polymer such as polyethylene glycol PEG), Which is proved after the research.