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Nanorobots or Antitumor Nanotanks : The New Cancertermination Strategies from Reality to Meth

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Nanorobotics Nanorobotics is a technology for making machines, robots in nanometer scale. More specifically, nanorobotics largely refer to the still-hypothetical technique of nanotechnology in the design and construction of nanoparticles and devices that range in size from 0.1-10 micrometers and are constructed from own molecular components or the molecules like DNA . However, it is still a hypothetical idea. Terminology such as nanobots, nanoids, nanites, nanomachines, or nanomites are also being circulated to describe these devices under research and development. A new technique in medicine will open up new avenues of hope for cancer patients. This technique relies on cell differentiation And the destruction of cancer cells without destroying body cells in less than 24 hours Unlike destructive chemotherapy, this technique is based on a new science called "Nanotherapy", specifically Nano robots.The aim of this descriptive minireview, generally, is to shed light on the main Applications of Nanorobotics as Antitumornew strategies.

Keywords: Nanorobots, Antitumor,Nanomedicine , Nanotechnology, Nanoparticles, Targeted drug delivery system, Nanoshells.

Scientists are still relatively unable to treat cancerous tumors, but research is ongoing and new treatments are being created every day. Studies that share technology with medicine have led to what is known as nanomedicine, a new field of medicine that aims to use nanotechnology to find new therapies. In the great evolution of nanoscience, scientists have programmed nanoparticles that reduce the size of tumors by cutting blood flow to them[1]. Thus , It is may be act as angiogenesis inhibitor . The term "nanoparticles" has been available on the surface of the medical arena in recent years, opening the door to hope for the treatment of many chronic and intractable diseases. This term refers to a new technique that has proven effective in primary animal experiments and is the culmination of the use of nanotechnology in medical field[2,1]. Moreover,this new trend may provide ample room for the treatment and elimination of chronic diseases. Currently, molecular geneticists and molecular biologists are developing nanoparticles to swim in the human body, with the aim of delivering drugs to diseased cells and resistant to malignancies. Although the technique is still in its infancy, scientists are very hopeful that it will make a revolutionary change in the world of health and medicine[1].

Constituents of nanorobots?

The nanobots are molecular DNA strands of 60-90 nm length. These strands are loaded with

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certain therapeutic chemicals for treatment of target disease with a significant influence on infected cells , that identifies them with precision[3]. This technique does not contain a metal sheets because the DNA is the basis for building these robots, which can involve several shapes and sizes - just like thousand infentreissmaller than the width of a human hair injected in diseased body - in the hope of revolutionizing medicine. The robots are made up of a rectangular plate of DNA - dimensions 90X60 nm - with a blood clotting enzyme called thrombin is attached to the surface, which bulds a significant wall preventing the blood-feeding of the tumor by thrombosis in the vessels, causing the death of the tumor tissue[4,2].

Mechanism of action

So far, the challenge for scientists is to design, build, and control nanorobots to target cancer cells without causing harm to healthy cells. Researchers have overcome this problem by using a simple strategy to cut blood supply from cancer cells by loading nanorobots with effective and safe stimulants. In the beginning, four thrombin molecules were installed on the plate and folded in a way that leaves a tubular vacuum in the middle and then injected intravenously [5,1]. These nanorobots are spread into the bloodstream, targeting the cancer cells. The secret to creating nanoparticles that target only cancer cells is to install the DNA aptamer on its surface, which targets a special protein called nuclein, which is produced largely on the surface of the endothelial cells of the tumor and is not present on the surface of healthy cells. When the nanorobot connects to the blood vessel of the tumor, where it throws its load inside, revealing the thrombin that manupulates the coagulation of blood cloting process .Nanoparticles work quickly and accumulate around cancer cells after hours of active nanorobots injection[6,5].

Experiments conducted by scientist

Scientists used mice injected with human cancer , when they developed cancer, they sent nanorobots for treatment. Studies showed the safety of this technique and its effectiveness in mice and large animals, where no changes were observed in the natural coagulation precesses of blood or cell form and archetecture, and most importantly it did not spread to the brain and did not cause any harmful lesions. After attacking the cancer cells, the nanorobots were removed and withdrawn from the body after 24 hours[7,4]. It is worth mentioning that the key to the success of this process is the release of thrombin within the cancer cells only cutting the blood suply. The cells of malignant tumors need a constant source of blood to grow and multiply. If the blood supply is stopped, cells will be unable to grow and die. A study conducted by a team of researchers at the University of Arizona - the United States, as well as the National Center for Nanoscience and Technology China academy , these studies exploited this weakness to eliminate the cancer cells by penetrating the micro vents of erythrocytes and make them clot at the tumor area. Significantly, this is done by loading the nanobots or nanorobot with the thrombin causing thrombosis wraped as a structural until , ia a way which appears as a benign particle until it penetrates the blood cells at the tumor site , starting coagulation process and prevent the feeding of the tumor and eliminate it[8,1,3].

In addition to the above weekpoint , there is another weakness that has made scientists distinguish cancer cells accurately. Cancer cells are distinguished from benign cells by the presence of the nucleolin protein on the surface of the malignant tumor. This is what the nano-robot seeks to settle in. It appears as friendly cells until it penetrates the blood Nutrient starts to release thrombin as mentioned above. Dsregulated accumulation of multifunctionalnucleolin mRNA and protein is found in a diverse range of cancers, and the level of surface nucleolin in cancers is much higher than in normal cells. The elevated expression of nucleolin is associated with a worse prognosis of cancer patients[9,5,1]

The treatment was tested on a group of mice with breast cancer. The results showed a significant response to treatment within 24 hours. It was also tested on a group of pigs and showed impressive results. Despite the impressive success of the new treatment, there are fears that nanorobots may infect and harm the benign cells giving the hall process counterproductive results. Dramatically, In mice with skin cancer, 3 of 8 mice showed complete tumor regression and median survival rate increased from 20.5 days to 45 days. In rats with lung cancer, tumor atrophy was observed within two weeks of treatment. This research is

still limited to animals, with great hopes that this technique will be applied to humans, leading to a revolution in medicine and technology[10,11,12].

Bacteriobots

A group of South Korean scientists has developed, for the first time in the world, a micro-robot called Nano Robots, which can detect and help cure cancer. A team of scientists used genetically modified bacteria to detect unique substances or proteins, such as the vascular endothelial growth factor, which grow in a dense amount, in areas, when cancer cells are present. The research provides "a new model to overcome specific previous ways of diagnosing and treating cancer, by this microbe-based nanorobots, which is able to move actively, and specifically deliver cancer drugs to infected cells . According to the innovetive design the bacteria, driven by a 3-micrometer robot, spray anti-cancer drugs automatically when they reach a cancerous cell. This is the first "nano-robot" of its biological kind to provide active medical treatment. The laboratory test indicates that the robot can only detect solid cancer, such as breast cancer or colon cancer. Researchers anticipates it could be more effective in detecting and treating various types of cancer at an early stage[13,14,15].

CONCLUSION

There are good reasons why the project to develop "cancer-terminator" nanoparticles has attracted scientists' attention. Current treatments, either by radiation or by chemotherapy, do not distinguish between healthy cells and cancer cells. In contrast, robots target tumor cells carefully and provide medication in controlled doses, thus avoiding the side effects of drugs that help them recover in effective ways. Furthermore, the sending of accurate particles in the human body is a simulation of the experiment of sending space probes in an infinite universe, which will make the accuracy of design and guidance is a great challenge for engineers and scientists, slow robots can not achieve the desired results and not useful to rely on clinical applications, In front of the scientists is trying to develop effective microbial robots, to target the treatment of cancer cells leaving cells intact without harm.

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