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Nano Robots for treatment of damaged blood vessels and heart holes

Athira Sathyan[1] and S.G.Prashanth[2]

[1]*UG Student, Department of ECE, MVJ College of Engineering, Bangalore, India. Email: athirasathyan1061995@gmail.com*
[2]*Assistant Professor, Department of ECE MVJ College of Engineering, Bangalore, India. Email: prashanth7@mvjce.edu.in*

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ABSTRACT

Nano robots are robots which are made in Nano scale, that are used in medical applications for various treatment. This paper deals with application of Nano robots in the treatment of blood vessels which are crushed or damaged and that leads to internal bleeding and it can be used for treatment of heart holes by covering the holes with Dacron. Dacron is a material which is used to replace natural body tissue. These will be stored in the payload of the robot.

Keywords**:** Nano robots, blood vessels, heart holes, internal bleeding, Dacron

1. INTRODUCTION

The concept of nanotechnology was developed by physicist Richard Feynman. But it was K. Eric Drexler's 1986 book, Engines of Creation: The Coming Era of Nanotechnology, which really put the idea of Nano robots. Nanorobotics is an emerging technology creating machines or robots in the scale of a nanometre (10^{-9} meters). More specifically, nanorobotics refers to the technology in which the bot will be made of components that are in Nano scale an thus known as Nano robot.

2. EXISTING SYSTEM

At present the nanotechnology is used in medical applications for the following purposes:

2.1 TUMOURS: - We must be able to treat tumours that is cells grouped in a clumped mass. While this technique can also be used to treat small amount of cells in the blood streams or the blood vessels. These are normally done by white blood cells and antibodies and this new technique is not intended to replace that. The goal of this technique is to destroy tissue which is affected and to minimize the risk of allowing a reoccurrence of the tumour growth in the body. It helps to treat tumour without the normal method of surgery. Such surgical methods ids used in brain tumours.

2.2 ARTERIOSCLEROSIS: -This is caused by fatty deposits on the walls of arteries. The device should be able to remove these deposits from the artery will. So that it helps in increasing the flexibility of the artery walls thus providing the blood flow through them more easily. It takes years for such deposition. Nano robots can be used to remove the deposition form the bloodstream.

***2.3 BLOOD CLOTS*:-** These blocks the flow of blood through the blood streams to reach vital organs. This can result in damage to the organs. In many cases, these blood clots are only detected when they cause a blockage and damage the organ often but not always the brain. By using a Nano robot in the body it helps to break up the clots into smaller pieces before they can cause damage to the human organs.

3. PROPOSED SYSTEM

In the proposed system of Nano robot treatment, it has a payload for the purpose of storing the medicine to cure. In case of covering of holes in ventricular septum, Dacron will be stored inside the payload of the Nano robot [4]. So the patient will swallow the Nano robot and the robot will start moving inside the body.

The robot will be moving into the blood vessels and then it is controlled by the doctor so that it can go to the required area. Once it reaches the spot, in case of covering the heart hole the robot will start ejecting the Dacron from the payload and thus the hole will be covered and at last the robot will be capturing a final image in order to verify the procedure by the doctor.

In case of internal bleeding, the robot will move through the blood vessel, thus after reaching the spot the robot will cover up the crushed blood vessel by the Dacron, which allow complete haemostasis.

4. DESCRIPTION

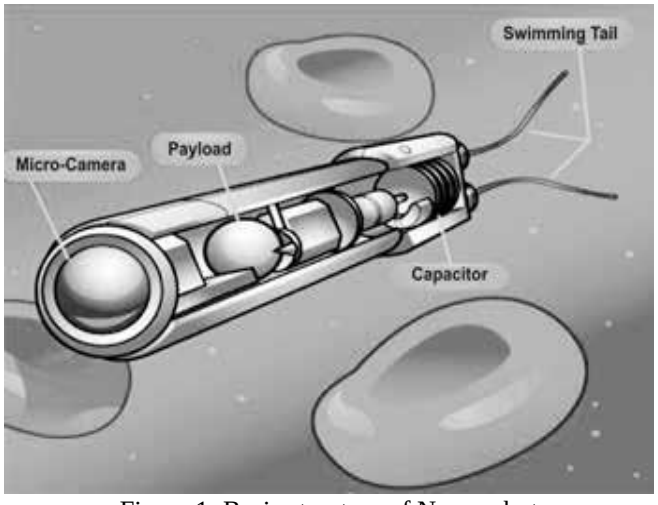

Figure 1: Basic structure of Nano robot

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The basic structure of Nano robot is shown in figure1. The Nano robot is having a micro camera at the front in order to capture images of the required areas as shown in figure 2. It has a propeller or a swimming tail depending upon the type of robot. There are a number of means available for active propulsion of our device.

Figure 2: Detection of effective area using camera

4.1 PROPULSION

Propeller: -The first Feynman prize in Nanotechnology was awarded to William McLellan for building an electric motor that fit inside a Nano object. These motors can be used inside the Nano robot. [3] This is used in the power propellers that would push (or pull) the Nano robot through the bloodstream as shown in figure 3. We also use a shrouded blade design to avoid damage to the surrounding tissues.

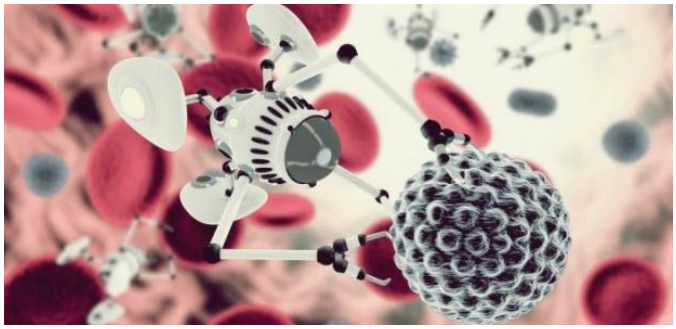

Figure 3: movement of Nano robot through blood vessels

Cilia/flagella: -In this we use some sort of vibrating cilia (similar to those of a paramecium) to propel the device. An alteration of this method would be to use a fin-shaped appendage. This is more useful at the molecular level of operation; an electric motor/propeller combination would be more practical at the scale we are talking about.

Electromagnetic pump: - It is a device with no moving parts to take conduction fluid inside the robot at the front and propels it out back with maximum speed. It uses magnetic fields to do this. It would require high field strengths, which will be practical with high capacity conductors. Here we use room temperature ceramic superconductors.

Jet pump: - In this we use a pump (with moving parts) to propel blood plasma in one direction, giving thrust in the opposite direction. The jet pump implementation can also be done using mechanical pumps or by using steam propulsion.

Membrane propulsion: -A vibrating membrane can be used to provide thrust. Imagine a concave membrane sealing off a vacuum chamber, immersed in a fluid under pressure that is suddenly tightened. This would have the effect of pushing some of the fluid away from the membrane, producing thrust in the direction toward the membrane. The membrane would then be relaxed, causing the pressure of the fluid to push it concave again. This pressure would impart no momentum to the device, since it is balanced by the pressure on the other side of the device.

Crawl along surface: -Rather make the device float in the blood, or in various fluids, the device could move along the walls of the circulatory system allowing for a firm grip without excessive damage to the tissue. It must be able to do this through flow of blood caused by the beating of the heart, and do it without tearing through a blood vessel.

4.2 POWER REQUIREMENTS

One of the important requirement of the Nano robot is power. We should to be able to give sufficient power for the Nano robot to allow it to perform all the required operations. There are two possible paths we can take for this. The first is to obtain the power from a source within the body that is by having a power supply within itself, or taking power from the bloodstream. [3,5,6] The second possibility is to have power supplied from a source external to the body.

Source with in a body*:* -There are many ways for this methods. The basic idea is that the Nano robot would carry its power supply within itself. It need the required amount of power to move to the site of the operation, perform its functions, and then exit the body.

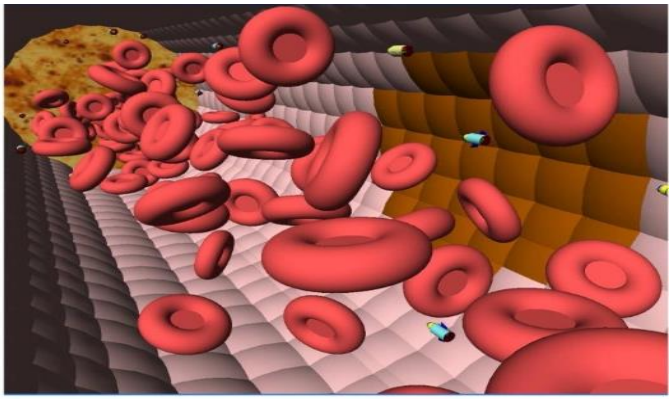

Figure 4: Movement of Nano robots through Blood stream [2]

Body heat:- This method will use body heat to power the Nano robot, that is using the entire body as a power supply. The basic problem with this is that a power supply requires an

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energy gradient for the function. Here we need areas of different temperature, so that we can set up a power flow inside.

Power from blood streams: -There are three possibilities method. In the first case, the Nano robot will have an electrodes mounted on its outer casing that will combine with the electrolytes present in the blood so that it forms a battery. Because of this a low voltage is produced. This voltage will last only till the electrodes are used up. The disadvantage of this method is that in the case of a clot or arteriosclerosis, there might not be enough blood flow to sustain the required power level. Here a backup would be required.

The second way to get power from the bloodstream is by the use of a fuel cell or by burning the chemicals present in the blood. This method is similar to a battery but the difference is that instead of taking power produced through current flow, here we take power produced by the chemical reaction. The problem with this is it will stop working if access to the blood is blocked, or if the chemicals are not replenished.

Carry the full amount of energy required directly on board- The third method is simply to carry the full amount of energy required directly on board. The first case is one in which we use conventional chemical batteries

5. RESULT

In the present world most of the treatment which are required for curing problems inside human body is done through surgical operations. Thus the use of Nano robots helps us to cure all those problems without surgery. Comparing with the surgical methods, using of Nano robots provide more controlled medical treatment. In case of cancer treatment using of Nano robots to destroy the cancer cells helps in replacing chemotherapy.

6. CONCLUSION

Thus the Nano robots can be used in medical field for the advanced treatment without conducting surgery. The result of the treatment through Nano robots is safe and medically controllable. Thus in future the application of Nano technology in medial field will gradually increase with the updating technologies and will provide the world a better medical facility.

7. FUTURE SCOPE

To use this Nano robots father to solve many other health issues which is difficult to be cured using normal treatments. Nano robots are mainly used to cure the problems that are very internal to the human body.

REFERENCES

[1] Nano Robots in Bio Medical Application. By R.B.Durairaj I, Shanker.P, and Dr.M.Sivasankar *PhD (lIT G).*

[2] *https://en.wikipedia.org/wiki/Nanorobotics.*

[3] *https://www.foresight.org/Conference/MNT8/Papers/Rubinstein/index.html.*

[4] *Dacron graft: MedlinePlus Medical Encyclopedia https://medlineplus.gov/ency/article/002345.htm.*

[5] M.A. Mohammed, et al., Automatic segmentation and automatic seed point selection of nasopharyngeal carcinoma from microscopy images using region growing based approach, *J. Comput. Sci. (2017), http://dx.doi.org/10.1016/j.jocs.2017.03.009.*

[6] M.A. Mohammed, et al., Artificial neural networks for automatic segmentation and identification of nasopharyngeal carcinoma, *J. Comput. Sci. (2017), http://dx.doi.org/10.1016/j.jocs.2017.03.026.*

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