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# NANOBOTS

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***ABSTRACT:***

Competition grows everyday. Today man is forced to compete against machines. This develops stress and the human body is subjected to various levels of trauma. Nowadays heart attacks become so common and the affected rate increases till date. Main reasons for this would be improper diet, tension and excess of Cholesterol, which blocks the arteries and not allowing the blood to pass through them hence causing heart attack. This usually occurs when a blood clot forms inside a coronary artery at the site of an atherosclerotic plaque.(blood clots on the roughened plaque) Approximately 21% of the people in the world get affected to heart attack. Present day treatment includes surgeries which are considered outdated when compared to today's technology.

***Keywords***— Arteries, atherosclerotic plaque ,

## NANOBOTS:

These nanoscale devices are able to perform higher with reduced time Researches in nanotechnology brought newer approaches in the field of medicine. This paper focuses on the employment of nanorobots for removing the heart blocks in a more effective and accurate manner. Nanotechnology promises to be a pathway for the future.

## REASONS FOR HEART BLOCKS:

Angioplasty, although having the higher success rate, is old fashioned. Today's technology promises a lot more than the insertion of a thin tube into your blood vessels. Nanorobots can be used in this process of curing heart blocks.

This paper focuses the causes of heart blocks, the current process of diagnostics and therapy. Later the idea of curing these heart blocks using nanorobots-is discussed in a theoretical and imaginative approach.

## CHOLESTROLS:

Heart blocks are caused due to the reasons above. Current diagnostic measures include painful process like the Angiogram. The treatment for the block is extremely dangerous, time consuming and painful.

Cholesterols are biochemical compound which are carried by lipoproteins found in blood and are essential for the normal functioning of the body to a certain extent. Cholesterol is fat- like substance (lipids) .These are chemical compounds of glycerol and unsaturated acid. Cholesterols found in the human body are of two types. They are

1. Low Density Lipids(LDL)
2. High Density Lipids(HDL)

**Low Density Lipids:**

- Contain more fat and less protein.

**What determines the blood level of LDL, and why is the level dangerous?**

Answers emerge from studies of specialized proteins, called LDL receptors, that project from the surface of animal cells. The receptors bind LDL particles and extract them from the fluid that bathes the cells. The LDL is taken into the cells and broken down, yielding its cholesterol to serve each cell's needs.

**High Density Lipids:**

- Harmless, highly stable and are disposed off from the body effectively.
- They don't stick to the walls of the blood vessels.
- Actually HDL's help in carrying the bad cholesterols from the blood stream to the liver from where it gets disposed.
- These contain more of protein, and less fat.

**FUNCTIONS OF CHOLESTROL:**

- Assists in manufacture of hormones or vitamin D
- Break down carbohydrates and proteins
- Help form a protective coating around nerves.
- Build cell walls and to produce bile

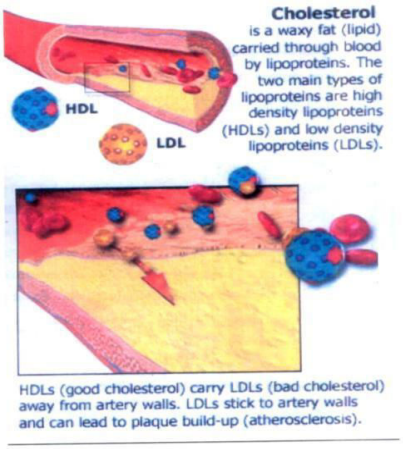
**RECOMMENDED STANDARD FOR THE DESIRED BLOOD:**

Cholesterol of low risk contains:

- Total Blood Cholesterol(TBC) level to be less than 200 mg/dl and

[1] Total HDL to be 40mg/dl or higher. High cholesterol

[2] Level ranges for TBC >240mg/dl.




It is natural that according to the variations in the blood pressure blood vessels continually contract and expand. But when the LDL's flow through the blood, due to their higher fat content they get accumulated on the walls of the blood vessels. These LDL's on accumulation make the blood vessels loose their elastic property. As a result the blood vessels will no longer be able to keep up the pressure variations in the blood. Hence these fluctuations in the blood are carried over to the heart and hence the heart is subjected to constantly varying stress which weakens it.

**PRESENT DAY TREATMENT (ANGIOGRAM AND ANGIOPLASTY):**

LDL's on lump of deposition close-into the diameter of the blood vessel. so as the concentration increases, the diameter of the blood vessel decreases. Hence the blood transportation to or from the heart is affected.

**ANGIOGRAM:**

The above problem's intensity is measured by a method known as angiogram. Here a small tube of diameter of about few micrometer with a catheter (flexible tube inserted into the body for injecting or draining away fluid) at the end is used. This is introduced into the veins at the thigh and up to the pericardium.

This catheter injects a radioactive fluid into the bloodstream, the flow of which is monitored by a continuous X-ray. When this fluid flows through the block, there will be a contraction in the thickness of the fluid line monitored by the X-ray. This contraction indicates the location of the block. Once the block is located, it is removed by a method known as angioplasty.

**ANGIOPLASTY:**

Here, the end of the catheter has a deflected balloon. This balloon is positioned under the block and inflated, so that the block bursts, and is carried away through the blood stream. The blocked area is covered with a one-way inflatable metal cylinder that is attached on the outside of the balloon to prevent the recursion of the block.

As the balloon is inflated, the cylinder attains shape, and gets locked on attaining maximum expansibility. This method is known as "balloon angioplasty".

**NANOBOTS:**

Nanorobots are Nano devices that may be about 3 to 5 microns in size. The individual parts used to make those nanorobots may be of 1 to 200 nm in size, mainly made of carbon, and may be given a coating of diamond. Which is the most inert and toughest material ever known? These nanorobots can be used for variety of purposes. Here, to treat heart blocks we use three kinds of nanorobots. purposes. Here, to treat heart blocks we use three kinds of nanorobots.

**FUNCTIONS:**

'Nanorobot' as a 'heart surgeon', should carry out certain steps and finally solve the problem. This concept involves three steps. They are

1. Locate the block.
2. Serve the block.
3. Provide molecular synthesis.

• Nanorobots with nanosensors to locate the block. These robots will need four kinds of nanosensors.

1. Pressure sensors
2. Acoustic sensors
3. Chemo sensors
4. Smart sensors

• Nanorobots equipped with nanolasers to serve the block after confirmation

In order to prevent the recurrence of the block, molecular synthesis is carried out. I.e. Nanorobot fills the burnt gaps with fresh flawless cells synthesized by the robots themselves. This process is known as "molecular synthesis"

**THE ACTUAL PROCESS:**

Sensor robot that navigates other robots through the bloodstream:

- All the three types of nanorobots needed for the process, are suspended in a liquid matrix and injected into blood vessels of the patient.
- Acoustic sensors in sensor robots get activated soon and begin navigating the army of robots through the blood stream to the pericardium.
- Simultaneously, the smart sensors present in the sensor robots, get activated and form a closed ad-hoc network connecting all the robots.
- This is very essential in order to guide all the nanorobots to the desired location. S

**SOPHESTICATED METHOD:**

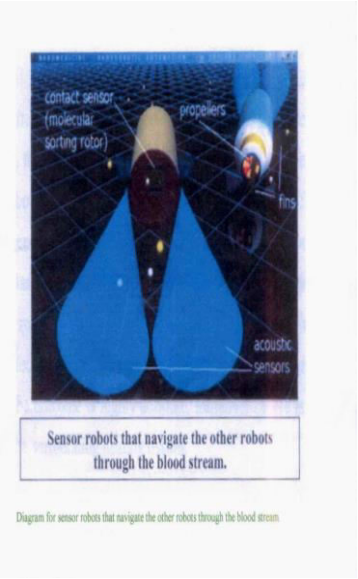



Diagram for sensor robots that navigate the other robots through the blood stream.The most sophisticated type of diagnosis is done here by the sensor robots, i.e. diagnosis inside the human body. These sensors, on reaching the periphery of the heart, scan the pericardial vessels, for blocks and locate the spot exactly.

**OPERATIONS:**

**OPERATION STARTS:**

1. The pressure sensors mounted on the sensor robots, scan the blood vessels for variation in the blood pressure.

2. This will act as the first confirmation.

3. This scanning for pressure variations is necessary, as in the region of the block, there will be a constriction of blood vessel and hence a rise in the blood pressure compared to that existing in the nearby areas.

4. These sensors will generate a report of the potential areas of heart block, based on the pressure mapping of the blood vessels.

**OPERATION PROCEEDS**:

- The second confirmation comes from the chemo sensors.

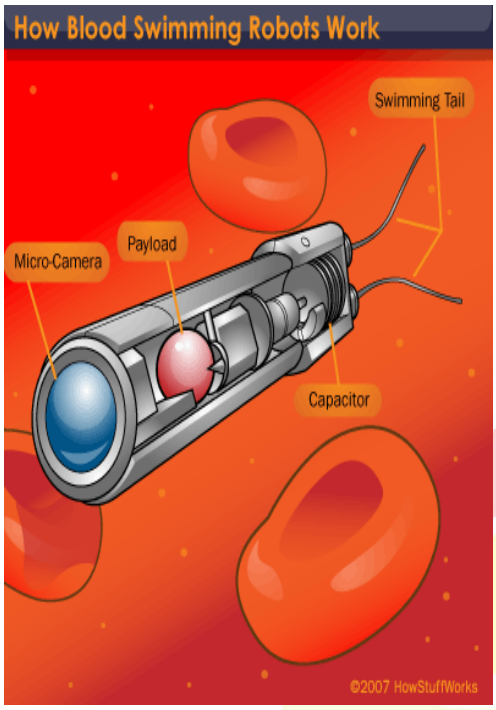
- These sensors scan the region they traverse, for the chemical composition of the cholesterols. That is, these sensors differentiate the cholesterol compounds accumulated on the walls of the blood vessels, from the actual composition of the tissues of the blood vessels. In this way, the block can be identified accurately.

- After successful location of the block, the second type of nanorobots, those equipped with nanoscalars, come into picture.

- These lasers, like the robots themselves, can be powered by the body itself, by means of the kinetic energy of the flowing blood, pressure of the blood flow, etc. thus these lasers can be powered by the most ingenious ways imaginable.

- These laser robots on activation based on the information flow through the network, effectively burn down the block.

Since the operation is held on a nanoscale, the outcome is highly accurate. Moreover, there is literally no damage to the surrounding tissues.




**OPERATION SUCCEEDS:**

1. The final leg of the operation is the responsibility of the molecular synthesizers.
2. These nanorobots, take the required biochemical substances from the blood or the surrounding tissues, and synthesize the cells of the blood vessels in order to seal the area of the block.
3. These cells are placed in the affected region and as a result, we have a whole new region of the blood vessel that is completely free from the threat of another block.

**ADVANTAGES:**

- Is a fast process
- Results are accurate, as the scale of operation is small.
- Involves less psychological strain compared to angioplasty
- Advanced and reliable technology.
- Harmful ray attack is reduced
- Aftereffects are eliminated.

**DISADVANTAGES:**

1. Expensive technology
2. Practical implementation is some what difficult.
3. Technological problems such as artificial reconstruction and artificial intelligence which results in robots going out of control of humans.

**CONCLUSION:**

The influence of nanorobots in performing heart surgery is found to be effective and a reliable means of treatment. As the construction of nanorobots is under progress, the ideas explained here could not be implemented at present. But it is sure that these ideas will be put into action within a period, which is not too far!

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