



# TOPIC OF THE WEEK

SEPT'18 (08 to 14)

## **Topic: World's Smallest Medical Robot to Help Treat Cancer Sets Guinness Record**

Scientists set a new Guinness World Record by creating the smallest medical robot - a device measuring just 120 nanometres that could assist in cancer and Alzheimer's treatments.

### **Background:**

The series of nanorobots was created by Soutik Betal during his doctoral research in Electrical Engineering under the guidance of professors Ruyan Guo and Amar S. Bhalla in the UTSA Department of Electrical and Computer Engineering and they could one day lead to huge medical advancements. They have developed nanocomposite particles that can be remotely controlled by an electromagnetic field. They function like extremely tiny robots that interact with biological cells.

The experimental demonstration of UTSA's remotely controlled medical robot was performed in late 2016 by Betal, who was conducting his doctoral dissertation research in Guo and Bhalla's Multifunctional Electronics

Materials and Devices Research Laboratory (MeMDRL). While the fabrication of core-shell structured materials have been developed through international research exchanges with collaborators in Brazil, the team discovered and Betal demonstrated the nanocomposites produced permeable motion.

### **Key Highlights:**

- The nanocomposites are made of two different types of multifunctional oxide materials in a core and shell configuration. The core is magnetic. It changes 'shape' in response to magnetic fields. The shell is ferroelectric. It converts pressure into electric potentials.
- The magneto-elasto-electric coupled effect in the nanocomposites act as arms and legs that move the nanoparticle around to interact with targeted biological cells. People were intrigued and initially puzzled at the fact that nanoparticles larger than the opening of a cell membrane's channels could actually enter inside.

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- The nanocomposite research also benefited from the MeMDRL's interdisciplinary research collaboration with faculty in the UTSA Departments of Biomedical Engineering and Physics and Astronomy. The research was supported in part by the National Science Foundation, by the U.S. Department of Defense and by the UTSA Office of the Vice President for Research, Economic Development and Knowledge Enterprise.
- Recognition for the work began when a study was published early this year in Nature -- Scientific Reports. The Guinness Book of World Records designation followed the article publication.

### **Advantages:**

The nanorobots can move cells to align with one another, push cells into different locations and possibly be used to deliver medication into a cell. Cancerous cells may be specifically targeted for treatment eliminating the need for some chemotherapy treatments and Alzheimer's disease victims could possibly receive special treatments by aligning cells which have ceased to live in the brain.

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So apart from being used for various medical treatments they will help primarily in Cancer and Alzheimer's treatment.

### **Challenges:**

A lot of research is being done but as the process to cure deals with cells it is very delicate and can be dangerous. In few cases it can even make the problems much worse. So one has to be careful where we use it and for which cases.

### **Conclusion:**

The greatest rewards may yet be ahead for the tiny robots. Their abilities leave room for much hope. Cancer is a disease in which cells multiply out of control and gradually build a mass of tissue called a tumor. There has been a large amount of research dedicated to the treatment and cure of cancer. Several types of treatments have been developed. The following are just some of the major examples of cancer therapy: surgery, chemotherapy, radiation therapy, biologic therapy, biorhythms, unconventional treatments and hyperthermia.

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Alzheimer's Disease is a progressive neurological disease. It often attacks the brain tissues causing memory loss of one's identity and regular behaviors. Statistics indicates that the rate of predicted people to get Alzheimer's will increase briskly as time goes on. There are currently no cures for such disastrous disease but there are currently approved treatments available that can help people within the early stages of Alzheimer's. Once the disease is too far along, deteriorated brain cells are nearly impossible to revive or regenerate without stem cells which have not been successfully ascertain.

So these medical robots will assist in many of the processes to cure both the diseases. There is still much work to be done to achieve the potential that lies ahead.

### **Suggested Reading:**

- ✓ <https://www.financialexpress.com/lifestyle/science/worlds-smallest-medical-robot-sets-guinness-record/1295265/>

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- ✓ <https://www.sciencedaily.com/releases/2018/08/180828104037.htm>
- ✓ <https://www.bartleby.com/essay/Alzheimers-Disease-F32NZJUSJFRSX>
- ✓ <https://www.bartleby.com/essay/Analysis-of-Treatments-for-Cancer-P3CC9HRZVC>