LAB TALK

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Nanorobot for drug delivery and diagnosis

In January, Adriano Cavalcanti and his colleagues are publishing a new paper in *Nanotechnology*. We decided to ask him about his work and what is next in the development of medical nanorobotics.

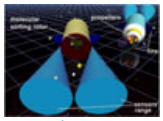
How can nanorobots be achieved?

In the same way microelectronics has provided new medical devices in the 80s, now the miniaturization through nanotechnology is enabling the manufacturing of nanobiosensors and actuators to improve cell biology interfaces and biomolecular manipulation. Fully operational nanorobots for biomedical instrumentation should be achieved as a result of nanobioelectronics and proteomics integration.

Dr Adriano Cavalcanti

Tell us about your work and how simulation can help in machine prototyping?

The methodologies and the implemented 3D simulation described in our study served as a test bed for molecular machine prototyping. The numerical analysis and advanced simulations provided a better understanding on how nanorobots should interact inside the human body. Hence, based on such information, we have proposed the innovative hardware architecture with a nanorobot model for use in common medical applications. The nanorobot takes chemical and thermal gradient changes as interaction choices for *in vivo* treatments. The use of mobile phones with RF is adopted in this platform as the most effective approach for control upload, helping to interface nanorobots communication and energy supply.



Nanobot sensor

What types of biomedical applications do you propose for this hardware architecture?

The proposed platform should enable patient pervasive monitoring, and details are given in prognosis with nanorobots application for intracranial treatments. This integrated system also points towards precise diagnosis and smart drug delivery for cancer therapy.

Drug delivery

What path are you taking to implement nanorobots?

The next steps in our work can be defined as follows: (a) model manufacturing with CNT-CMOS biochip integration; (b) laboratory studies for *in vivo* tests; and (c) commercialization. The pipeline for development in the medical sector typically requires research and efforts to get new ideas out of laboratories and into the marketplace. For a therapeutic new drug, surgical devices or even a simple new vaccine: time, resources and creativity are demanded to make it happen. The rules are always the same and it would not be any different for medical nanorobots. We are aware of it, and we are working cooperatively to lead such a development.

About the author

Adriano Cavalcanti is CEO and chairman of CAN Center for Automation in Nanobiotech. He has participated in several joint work collaborations for the fast development of nanotechnology and biomolecular engineering automation. He has been implementing nanobioelectronic architecture integration to use nanorobots in diabetes, cancer, cardiology and aneurysm treatments. He is working with CAN to provide new effective medical devices through the development of commercial nanobiotechnology. For more information visit www.nanorobotdesign.com or

www.canbiotechnems.com.