

Scientists address how technology is transforming medicine in the Innovation Forum organized by the Pfizer Foundation and the Ramón Areces Foundation

THE EXPERTS STRENGTHEN THE NEED TO TRANSFER THE RESULTS OBTAINED IN TECHNOLOGICAL RESEARCH TO THE HEALTH SYSTEM AND THE SOCIETY

- *It is estimated that, in the next 5 years, the use of exoskeletons for rehabilitation and assistance to people who have suffered neurological damage could be implemented*
- *Spanish work groups have pioneered the research, development and validation of rehabilitation robotics and lead the application of exoskeletons*
- *Develop increasingly precise and selective nano-devices, more sophisticated and biodegradable implants, the use of 3D printing and stem cells, some of the developing lines in nanotechnology*
- *Drones can have multiple applications in medicine: transfer of medicines to difficult areas, analysis of allergens or air pollutants, transfer of organs or intervention in emergency processes*

Madrid, April 26, 2016.- Can drone technology open new fields of application to the world of biomedicine? What new perspectives is nanotechnology bringing in the diagnosis and treatment of diseases? Will neurorobotic help improve patients' lives? These are some of the issues raised in the framework of the **Innovation Forum "Exponential Medicine, how technology is transforming medicine"**, organized by the **Ramón Areces Foundation** and the **Pfizer Foundation**.

The Forum, moderated by **Dr. José Luis Puerta López-Cózar**, patron of the Pfizer Foundation, has brought together renowned scientists to "*contribute to a more thorough understanding of the profound change that is currently being practiced in Medicine, through current technologies, which accelerate and transform knowledge about the human being and everything related to the broad field of the clinic*", he says.

In this sense, "*it is said that nanotechnology is called to be the next industrial revolution; and, without a doubt, medicine will benefit from many developments in this field*", says **Prof. Ramón Martínez Máñez**, scientific director of CIBER-BBN (Network Biomedical Research Center in the thematic area of Bioengineering, Biomaterials and Nanomedicine).

On the one hand, the analytical and diagnostic techniques, in which progress is being made to achieve smaller and more effective devices capable of diagnosing diseases early from very few molecules or cells.

On the other, the release of drugs, whose objective is the design of release systems formed by an active ingredient and a transport system (nanoparticles)

that can direct the drug to the appropriate site and in the appropriate amount. And finally, regenerative medicine - of great potential - that seeks the maintenance, improvement or restoration of the function of cells, tissues or organs by applying methods related to cell therapy and tissue engineering.

For Prof. Martínez *"in this field the immediate future must be directed towards the translation and transfer of the results that are being obtained from the investigations, to the health system and to the market, for which the approach to the business environment and to the clinical world must be improved"*. And from the point of view of research, continue working on making nano-devices increasingly precise and selective, more sophisticated and biodegradable implants, the use of 3D printing and stem cells, etc.

For this, as this expert emphasizes, a key aspect for the success of the research is the integration of multidisciplinary teams that allow addressing a specific problem from different perspectives. Likewise, structures such as CIBER-BBN -which has some of the best Spanish research groups in the areas of Bioengineering, Biomaterials and Nanomedicine- provide advantages in research, since it offers a common framework that favors scientific collaboration between groups of different institutions, which helps to achieve high level results in a shorter time.

Robotic neurorehabilitation and exoskeletons

The exoskeletons, which constitute an evolution of the first robotic devices, are currently being implemented experimentally in the field of rehabilitation and assistance to people who have suffered neurological damage as a result of diseases such as stroke or spinal injury and their total is expected consolidation in the next 5 years.

This technology is characterized by the intimate relationship, physical and cognitive, between the patient and the robot. *"The exoskeleton has to identify from its sensors what the intention of the user is and has to assist their movements from the application of forces in the segments of the patient's body. Therefore, safety in the use of the device is paramount"*, explains **Prof. José Luis Pons Rovira**, director of the Neuro-Rehabilitation Group of the Department of Functional and Systems Neurobiology of the Cajal-CSIC Institute.

In this regard, **Prof. Pons** points out that: *"Spanish research groups have pioneered the research, development and validation of rehabilitation robotics, and are leading, along with other teams, the development of exoskeletons. This, despite the lack of strategic programs that support consolidated groups to continue working with guarantees"*, he says.

For Prof. Pons, it is foreseeable that in the coming years an economy of scale will be generated that will make these devices more economical, making them more accessible. On the other hand, it will be necessary to work on improving the user experience of the device, getting for example that the devices respond more naturally to the user's intentions, are more comfortable to use and offer a wider range of possibilities.

Currently, robotic neurorehabilitation - already consolidated in Spain - allows for more intensive training, with a greater number of repetitions of physical exercise and with more precise movements, while promoting greater patient participation. In addition, robotic devices can collect information about the rehabilitation process itself, generating reports for the patient himself or for the therapist.

Drones and Biomedicine

For its part, advances in robotics and new materials have also allowed a new field of application to the world of biomedicine of remotely piloted aerial technology or drones, as measurement tools and logistics of first choice in research or work projects field.

The transfer of medicines or vaccines to difficult areas, the analysis of microorganisms, allergens or air pollutants, the detection of infectious vectors, the sampling in risk areas, the monitoring of key environmental factors for the appearance of pathogens or their vectors , the generation of physical risk maps, the precise fumigation with biological agents capable of neutralizing vectors, the transfer of organs or the intervention in emergency processes, are only some applications of these technologies.

But, as **Carlos Bernabéu**, CEO of Arborea Intellbird, comments, there are factors such as security, the latest technological advances or regulation, which will modulate the implementation of these solutions, which are still in an incipient state.

The implementation of these technologies in Spain in the biomedical area has great potential, which will take shape. *"The aspects of regulation, even poorly mature, are key in this process in our country"*.

Technology and medicine: help or complication

During the Forum, we also wanted to address the possible ethical conditions linked to advances in Medicine. *"Biomedical technologies undoubtedly generate controversies, but it seems to me that, beyond questionable and extreme cases, the development of this sector is producing much more benefit than threats, in addition, the benefits are real and the threats quite imaginary, at Less so far. I don't think we should confuse technologies with fantasies either, although sometimes it may not seem easy to distinguish one from the other"*, says **Prof. José Luis González Quirós**, Professor of Philosophy at the Rey Juan Carlos University in Madrid.

For this expert, technology does not imply special ethical problems, but it creates possibilities and the ethical problem is on another level, it always has to do with free decisions. *"The chances that technologies dehumanize are really very scarce, what dehumanizes is stupidity, which, after all, is also quite human"*, he concludes.

Ramón Areces Foundation

Since 1976, the Ramón Areces Foundation has as its main objectives to contribute to create a solid scientific and technological structure in Spain, which allows to improve people's lives and to search for solutions to the future

challenges that modern society has before them in their Main orders: economic and educational, mainly.

Pfizer Foundation

Since 1999 the Pfizer Foundation has the mission of improving the health education of the Spanish population through the promotion of the concept of healthy aging, from any stage of life, as a natural, optimistic and dynamic process, developing initiatives that recognize and support research, innovation, social commitment and the dissemination of knowledge in health.

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