

## The Regione Lombardia allocates 6.8 million euro to the **European Centre of Nanomedicine: Prof. Francesco Stellacci (M.I.T.) to direct the first research programme**

**The research programme, performed in collaboration with the 'Carlo Besta' Neurological Institute Foundation, will focus on the development of new materials and technologies for the treatment of neurological diseases.**

Milan, 19 February 2010 – **Roberto Formigoni**, President of the Regione Lombardia (the Lombardy Region Administration), together with **Adriano De Maio**, President of the **European Centre of Nanomedicine Foundation (CEN)**, **Carlo Borsani** and **Ferdinando Cornelio**, President and Scientific Director of the 'Carlo Besta' Neurological Institute IRCCS Foundation, respectively, attended the presentation of the first research programme to be undertaken by **CEN**. The programme will be directed by **Prof. Francesco Stellacci**, an Italian scientist with a ten year history of work in the field of advanced technologies in Nanomedicine at the **Massachusetts Institute of Technology** in Cambridge, one of the most prestigious research institutes in the USA,.

Four lines of research will be developed in this new research programme that focuses on the development of new materials and technologies for the treatment of neurological diseases.

The **European Centre of Nanomedicine Foundation (CEN)** was founded in Milan in July 2009 by 10 prestigious public and private research centres, under the auspices of the Regione Lombardia (the Lombardy Region Administration), which has provided significant financial support for the project. The aim of the centre is to develop **innovative solutions for the prevention, diagnosis and treatment of cardiovascular and neurological diseases, and cancer.**

*"We are delighted to inaugurate the first scientific Programme at CEN so soon after its launch."* – announces **Adriano De Maio**, President of the CEN Foundation – *"This programme is the first step towards establishing an internationally recognised centre of excellence in nanomedical research and it is a testament to our aim of building a truly interdisciplinary network linking CEN founding partners"*.

This aim is reflected in the steps that led to the launch of the first research programme: Prof. Francesco Stellacci – who said that he was "thrilled to embark upon this new adventure" – was recruited by the 'Carlo Besta' Neurological Institute IRCCS Foundation, but he will work with his team of three international researchers in the highly technological laboratories of the IFOM-IEO Campus (the cancer research centre founded in 2007 by IFOM - the FIRC Institute of Molecular Oncology - and IEO - the European Institute of Oncology).

*"Getting Professor Stellacci to join our team was a dual achievement"* - says **Carlo Borsani**, President of the 'Carlo Besta' Neurological Institute IRCCS Foundation of Milan, the CEN research centre that recruited the scientist. *"Not only has the Besta Institute contributed to creating the conditions necessary for leading Italian scientists to feel able to return to our country, but, in doing so, we bring great hope to our patients, since nanomedicine will have a dramatic impact on diagnosis and treatment at the Besta in the near future. The inauguration of CEN is the tangible result of investments made by the Besta Institute, thanks to donations received from members of the public through their "5 x 1000" voluntary tax donation.*

*"The vision of CEN and of the scientific research programme at the Besta Foundation"* – explains **Ferdinando Cornelio**, Scientific Director of the 'Carlo Besta' Neurological Institute IRCCS Foundation – *"is to invest and become internationally competitive in advanced scientific and technological fields such as nanotechnology. We aim to develop translational research products that will rapidly be applied to the diagnosis and treatment of diseases. The group will also actively seek to patent and gain intellectual property rights on their research."*

*"A final objective"* - continues Cornelio – *"is to create new professional profiles that are*

*already appearing in the United States but that are yet to be established in Italy: medical doctors with PhDs in technical subjects, who can bridge the worlds of medicine and technology."*

*"Research centres belonging to the CEN Foundation will share resources, know-how and technologies in order to avoid the wasteful duplication of efforts and to allow the most efficient use of pre-existing structures" - concludes the Scientific Director of the 'Carlo Besta' Foundation.*

*"CEN will be a centre of excellence for young researchers around the world wishing to use the tools of nanotechnology to develop innovative ways of treating disease." - explains **Francesco Stellacci**, Full Professor at the Dept. Of Engineering and Material Science at the Swiss Federal Institute of Technology of Lausanne – "We aim to recruit up-and-coming young researchers who have proven themselves abroad, to create a stimulating dynamic research environment. My research group will focus on the use of nanoparticles for drug delivery and also as medical contrast agents".*

The project will integrate the know-how of scientists with different backgrounds to conduct the following lines of research: 1) the development of magnetic and fluorescent nanoparticles as contrast agents for the diagnosis of neurological conditions. This should improve the detection threshold for small dysfunctions in the brain; 2) the development of nanomaterials as drug delivery vectors, in particular, as new vectors for the delivery of genetic therapies for cancer. These micro-vehicles will transport drugs directly to the target (cancer) cells and release them in a programmed manner depending on the therapeutic need; 3) the development of microsensors that can detect tiny amounts of DNA, proteins, enzymes or peptides for the early detection of disease: 4) the development of self-assembling nano-structured materials for regenerative medicine. These will help to repair damaged organs and, in particular, damaged nerves.

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## 1. In depth: meet Francesco Stellacci

Francesco Stellacci was born in Bitonto (BA) in 1973.

He graduated in Materials Engineering from the Politecnico di Milano (Milan University for Engineering, Architecture and Industrial Design), Italy, in 1998.

He is Professor at the Department of Engineering and Materials Science at the EPFL in Lausanne (Switzerland).

He is Associate Professor at the Department of Materials Science and Engineering at M.I.T. in Cambridge, USA.

He is Adjunct Professor at the Department of Chemical Engineering at the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea.

He is Adjunct Researcher in the Nanomedicine group at the 'Carlo Besta' Neurological Institute of Milan, Italy.

Stellacci has been awarded 12 international prizes, including: Finmeccanica, Career Development Chair (2004), Du Pont, Young Professor Award (2005), Technology Review, Top 35 Innovators under 35 (2005), Junior Bose Award for Excellence in Teaching (2007), NASA, Nanotech Briefs Nano 50™ award winners (2007), Popular Science Magazine, Brilliant Ten (2008).

Stellacci has published numerous articles in prestigious scientific journals, amongst which: Nature Materials, Science, and Proceedings of the National Academy of Sciences USA.

## 1. In depth: what is Nanomedicine?

Nanomedicine is a field that is expected, in the near future, to deliver radical changes in the way we diagnose and treat diseases. Italy, particularly the Lombardy region, is well-equipped in terms of expertise in this field at the scientific, technological and industrial levels.

“Nanomedicine lies at the interface between nanotechnology and biomedical research” explains **Marco Foiani, Scientific Director of IFOM, the FIRC Institute of Molecular Oncology**, and chairman of the organizing committee of the **European Centre of Nanomedicine**. “This field is today the most promising frontier of scientific research. In the medium-long term future it will allow us to provide rapid diagnoses for all, at earlier stages of disease than is possible today. We will also be able to develop new, personalized therapies based on genomic and post-genomic research.” But Foiani also adds that “to achieve this, scientists must adopt systems-based interdisciplinary approaches that integrate knowledge which, until now, has been regarded in isolation, such as molecular biology, medicine, chemistry, physics, mathematics, informatics and engineering. We have been applying this approach for several years now, in our field of cancer research”.

The inauguration of the European Centre of Nanomedicine will allow the development of advanced diagnostics, for the early detection of disease, and of mass screening approaches for cancer, neurological diseases and cardiovascular diseases. These tests will be based on proteomic, genomic and metabolic analyses. Newly developed therapeutic strategies will permit the temporally- and spatially-controlled administration of personalized treatments.

For some diseases, such as cancer, it will be necessary to identify pathological disease precursors through radiology exams, or through minimally invasive tests, such as simple blood or saliva tests that can be performed during routine check-ups, and which will be accessible to all patients. These tests will indicate the need for personalized therapies, which, when administered, will revert any malignant lesions into benign growths, or which could even completely eradicate the disease.

In the worst case scenario, malignant lesions will be ‘contained’ in such a way as to limit their impact on the quality and duration of life. This treatment paradigm will be paralleled by similar advances in other medical sectors. Personalized nanomedicine depends on the development of SMART THERAPEUTICS. To achieve this, nanotechnologies are critically important for the **identification of molecular signatures** (“profiles” that can help to predict therapeutic effectiveness) and for the development of new therapeutics for the targeted prevention of disease and for personalized patient treatment (using so-called “nanovectors”).

The design and construction of nanovectors and nanomedical contrast agents, their administration to patients, and the assessment of their efficacies will require **state-of-the-art**

**mathematical modelling and informatics.** This cutting-edge expertise requires knowledge of molecular biology, and in particular of those fields that focus on nucleic acids (DNA and RNA) and the proteins expressed by them, namely the fields of genomics and proteomics. The new personalized medicines of the future will also be shaped by knowledge of microelectronics and micromechanics.

### **3. In depth: what is the European Centre of Nanomedicine?**

The “European Centre of Nanomedicine” Foundation was inaugurated on 23<sup>rd</sup> July, 2009, through the joint efforts of 10 private and public research centres based in Lombardy, and under the auspices of the Regione Lombardia (the Lombardy Region Administration), which provided significant financial support to the project:

- · Fondazione IFOM (Istituto FIRC di Oncologia Molecolare – FIRC Institute of Molecular Oncology)
- · Fondazione IRCCS “Ospedale Maggiore policlinico Mangiagalli e Regina Elena”
- · Fondazione “Scuola Europea di Medicina Molecolare” (SEMM – European School of Molecular Medicine)
- · Genextra S.p.A.
- · Istituto Europeo di Oncologia” (IEO – European Institute of Oncology)
- · Istituto Neurologico Carlo Besta (“Carlo Besta” Neurological Institute)
- · Politecnico di Milano (Milan Polytechnic University for Engineering, Architecture and Industrial Design)
- · STMicroelectronics S.r.l.
- · Università degli Studi di Milano (University of Milan)
- · Università degli Studi di Pavia (University of Pavia)

Other institutions have formally requested to take part in CEN: the Fondazione IRCCS Istituto Nazionale Tumori di Milano (Milan National Cancer Institute), the Policlinico San Matteo of Pavia, Fondazione Salvatore Maugeri of Pavia, the Fondazione San Raffaele of Milan (San Raffaele Foundation) and the Università degli Studi of Milano-Bicocca (University of Milan-Bicocca).

CEN was therefore established based on an alliance of highly prestigious institutions for research, medical care and higher education, which, together with industry have agreed to join forces and share knowledge in a cooperative project that aims to develop novel technologies and approaches to improve the health of man.