



Una manera de hacer Europa



BUENAS PRÁCTICAS

Actuaciones Cofinanciadas

Adequacy of new laboratory spaces and acquisition of scientific equipment for the Institute for Bioengineering of Catalonia's (IBEC), to the development of new technologies in regenerative medicine and nanomedicine”
Institute for Bioengineering of Catalonia's (IBEC)

Programa Operativo de Catalunya

Año 2019

Fondo Europeo de Desarrollo Regional

It is introduced as a Good Practice the project Adequacy of new laboratory spaces and acquisition of scientific equipment for the Institute for Bioengineering of Catalonia's (IBEC), to the development of new technologies in regenerative medicine and nanomedicine”.

This project consists in providing new laboratories for the recently incorporated research groups into the Institute for Bioengineering of Catalonia (hereinafter, also “IBEC”), in order to have the IT resources, auxiliary laboratory equipment and a cutting edge and specific scientific equipment to improve research carried out in the nano-medicine and tissue engineering fields applied to the development of advanced therapies.

Therewith IBEC will be able to continue generating an excellence research and, at the same time, working with the industrial sector to develop new diagnostic systems and treatment. The early diagnosis, the new therapies based on regenerative medicine, the improvement of the quality of life regarding the population ageing, and the technology advances that increase efficiency and the possibility to make healthcare more sustainable there are some examples of fields where IBEC can contribute with its cutting edge research.



The project has a total eligible cost of 1.400.000€, with financial support of ERDF funds that amounts to of 700.000€. This project has involved a total of 47 researchers (19 women and 28 men) and it will lead to the creation of 36 research jobs (14 women and 22 men).

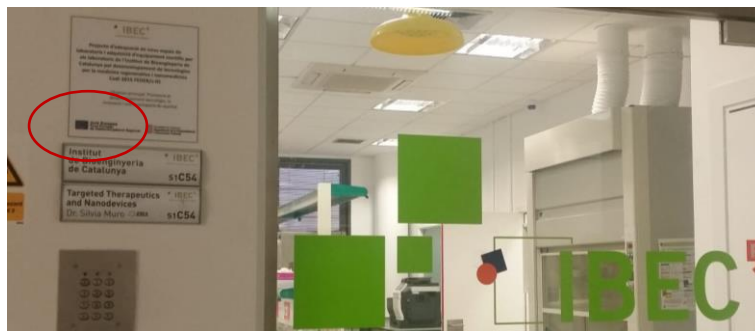
This operation is presented as a Good Practice because it fulfills the following standards:

1. The role of ERDF has had a wide dissemination throughout the beneficiaries, the potential beneficiaries and the general public.

Posters in the lobby of the conditioned spaces with the help of EFDR fund:



Hall of Campus Diagonal-Besòs building.



Laboratory entrance door.

Web page:

The co-financing of this project by ERDF has been publicized through IBEC's web page.

<http://www.ibecbarcelona.eu/ca/un-nou-centre-per-a-libec/>.

Un nou centre per a l'IBEC
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L'IBEC ha ampliat les seves ubicacions físiques, ja que dos dels seus grups s'han traslladat a un nou centre a l'altra banda de l'avinguda Diagonal.

El Campus Diagonal-Besòs de la Universitat Politècnica de Catalunya (UPC) és un nou espai per a la innovació i el coneixement, està situat en el punt on es troben Barcelona i la ciutat de Sant Adrià del Besòs. Actualment, l'Escola d'Enginyeria Barcelona Est (EEBE) és el principal centre que s'hi allotja.

Els nous locals de l'IBEC (que sumen en total 900 m²) s'han dissenyat seguint els requisits específics dels seus ocupants. Tant el nou grup de recerca de l'IBEC, Synthetic, Perceptive, Emotive and Cognitive Systems (SPECS), dirigit pel professor d'investigació ICREA Paul Verchure, com el grup Biomedical Signal Processing and Interpretation (BIOSPIN), dirigit per Raimon Jané, ja s'hi han traslladat. A més dels espais per a laboratori, també s'hi han dispostat espais de reunió i de tipus administratiu per a us del personal de suport i per als visitants. Actualment aquests dos grups de l'IBEC ocupen l'Edifici C; el grup BIOSPIN està ubicat a la planta 5 i el grup SPECS s'estarà a la planta 6, a banda de tenir algunes de les instal·lacions en el soterrani dels edificis C i I. A més, es preveu que, d'aquest trasllat, en sorgiran noves col·laboracions, així que altres grups de la UPC, com ara el de la investigadora associada de l'IBEC Maria Pau Ginébra, també hi estan allotjats.

"Estem convençuts que les noves instal·lacions – i el nou entorn de col·laboració universitari – possibilitaran que aquests grups potencin el nivell d'excel·lència que ja han demostrat tenir fins al moment", afirma el director de l'IBEC Josep Samitier. "Aquesta nova ubicació representa un nou salt en l'objectiu de l'IBEC d'aspirar a un centre de primer nivell".

Tot això ha estat possible gràcies a una subvenció d'1.400.000 euros procedents del Programa Operatiu (PO) FEDER de Catalunya 2014-2020, que finança espais i equipament per a l'institut a través del projecte "Adequació de nous espais de laboratori i adquisició d'equipament científic per als laboratoris de l'Institut de Bioenginyeria de Catalunya per al desenvolupament de tecnologies per a la medicina regenerativa i nanomedicina".



Other news related with the research carried out into our facilities has been published on the same web page, with an special mention to the ERDF Operational Programme Catalonia 2014-2020:

Financiación de la ERC para un nuevo enfoque de la diabetes en el IBEC

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El Dr. Javier Ramón es uno de los seis investigadores en Cataluña premiados con una Starting Grant del Consejo Europeo de Investigación (ERC, de sus siglas en inglés). El investigador senior del grupo Sistemas biomiméticos para ingeniería celular ha recibido financiación para su proyecto "Diabetes Approach by Multi-Organ-on-a-Chip" (DAMOC), de manos del prestigioso organismo europeo de financiación. Con este apoyo, que tendrá una duración de hasta cinco años, Javier iniciará una nueva línea de investigación para diseñar una innovadora herramienta para probar medicamentos para la diabetes, así como para mejorar diferentes enfoques para probar fármacos. El dispositivo "multiórgano en un chip" proporcionará nuevas terapias para prevenir la pérdida de masa de células beta (las encargadas de producir la insulina) en los casos de Diabetes tipo 1, y los defectos en la captación de glucosa por el músculo esquelético asociado a la Diabetes tipo 2.

"Este proyecto me dará la oportunidad de tener un grupo multidisciplinar de investigadores que trabajará de manera sincronizada desde el principio, la experiencia más gratificante que un investigador puede tener", comenta Javier Ramón. "Es importante destacar que también me permitirá apoyar a jóvenes investigadores para iniciar o continuar su carrera científica, algo que por lo general no es fácil".

Este año, el ERC ha repartido por todo el continente 325 subvenciones "Starting Grant" (destinadas a investigadores con una trayectoria profesional científica muy prometedora), para apoyarles en las primeras fases de su carrera. Los otros cinco investigadores premiados en Cataluña son del Centro de Investigación en Economía Internacional (CREI), de la Fundación Institut Català de Recerca de l'Aigua (ICRA), de la Universidad Pompeu Fabra, de la UPC y del Barcelona Supercomputing Center.

"En IBEC hemos conseguido, en nuestra corta historia, diez subvenciones de investigación ERC, seis de ellas Starting Grants", comenta el director del Instituto Josep Samitier. "Este último logro por parte de Javier demuestra el compromiso continuo del IBEC con la excelencia en la investigación y, en concreto, nuestro compromiso en ayudar a los jóvenes investigadores a establecer su propio grupo en el IBEC, como Centro de Excelencia Severo Ochoa".

La adecuación de los espacios de laboratorio (103,81 m²) que ocupará este investigador i su grupo a partir del 2017 como nuevo grupo de investigador junior del IBEC (Biosensors for Biomedicine), se ha realizado gracias a los fondos recibidos del programa operativo FEDER Catalunya 2014-2020 a través del proyecto "Adequació de nous espais de laboratori i adquisició d'equipament científic per a els laboratoris de l'Institut de Bioenginyeria de Catalunya pel desenvolupament de tecnologies per la medicina regenerativa i nanomedicina".



La última incorporación del IBEC avanzará en los sistemas de administración de medicamentos

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IBEC recibe una nueva incorporación este mes, con la Prof. Silvia Muro unánimemente al Instituto como profesora de investigación ICREA para liderar su grupo Targeted Therapeutics and Nanomedicine.

En su nuevo puesto, llevará a cabo investigaciones sobre nano-ensamblados microestructurados que pueden cargarse con medicamentos para atacar las alteraciones crónicas que afectan a nuestras poblaciones pediátricas y de avanzada edad, como las enfermedades neurodegenerativas, cardiovasculares o metabólicas, así como el cáncer.

La Prof. Muro ha pasado los últimos nueve años en la Universidad de Maryland, primero como Profesora Asistente y luego como Profesora Asociada Jralta con un cargo conjunto en el

Fachel Department of Biotechnology and Institute for Biosensor and Biosystem Research. Allí, estableció un sólido programa de investigación en el campo de la administración de medicamentos, que había iniciado como Profesora Asistente de investigación en la Facultad de Medicina de la Universidad de Pennsylvania. Asimismo, recibió su doctorado en Ciencias (Biología Molecular) por la Universidad Autónoma de Madrid, tras lo cual recibió diversas becas y tres sin posiciones de investigador médico, biomolecular y en fármacos dirigidas en España, Canadá, Uruguay y EE. UU. Recibió el premio LAM Outstanding Life Science Inventor of the Year en 2011 y el premio Junior Outstanding Outstanding Engineering Research en 2012, y es miembro permanente de la Nanotechnology (NANO) Study Section.

El objetivo principal de su grupo en IBEC será comprender las propiedades biológicas de estos ensamblados portadores de fármacos, que influyen en cómo se perciben y transportan los medicamentos dentro del cuerpo y cómo interactúan con nuestros tejidos y células. Debido a la falta de comprensión sobre los parámetros biológicos y de vida que rigen la interacción y el transporte de estos portadores de fármacos en el cuerpo, aún no hemos podido diseñar dispositivos que puedan acceder efectiva y específicamente a los células enfermas sin dañar a las sanas, o que puedan penetrar con seguridad en la barrera hematoencefálica", explica la Prof. Muro.

Su grupo abordará esta investigación con un enfoque multidisciplinar dirigido a reflejar las variables biológicas clave que se encuentran en el cuerpo. "Usaremos una batería de herramientas analíticas, predictivas, in silico, modelos celulares y animales, y muestras de pacientes", dice ella. "Una mejor comprensión de las propiedades biológicas nos ayudará a implementar fármacos mejorados biológicamente para los estándares que tienen componentes neurodegenerativos, cardiovasculares y metabólicos".

La actividad del nuevo grupo está totalmente acompañada con la estrategia de investigación del IBEC, que centra sus esfuerzos científicos y tecnológicos en aplicaciones de bioingeniería para la medicina del futuro, el mejoramiento activo y las terapias regenerativas. El proyecto de Silvia Muro potenciará la marca crítica y el liderazgo del Instituto en el campo de la administración dirigida de fármacos, elevando su influencia al nivel de los otros dos campos principales de la nanomedicina -el diagnóstico y la medicina regenerativa, en los que IBEC ya cuenta con reconocimiento internacional.

El espacio de laboratorio de 1231 m² de la Profesora Muro en IBEC se gracias a PO FEDER Catalunya 2014-2020, que financió espacios y equipos en el Instituto a través del proyecto "Adequació de nous espais de laboratori i adquisició d'equipament científic per a els laboratoris de l'Institut de Bioenginyeria de Catalunya pel desenvolupament de tecnologies per la medicina regenerativa i nanomedicina".



Publication of equipment sheets (with the information on technical features and scientific equipment applications). As an example, the Confocal Microscopic sheet, financed by FEDER funds:

Confocal microscope

Confocal imaging

The LSM 800 is a confocal laser scanning microscope, equipped with different colors of lasers, a highly sensitive GaAsP detector technology and a fast linear scanning for super resolution imaging. It has multiple applications in biology, medicine and materials.

It allows:

- Fluorescence imaging
- Confocal imaging
- Differential Interference Contrast (DIC) imaging
- Brightfield imaging

Technical specifications:

- Diode lasers:
 - Diode laser (405 nm, 5 mW), laser class 3B
 - Diode laser (488 nm, 10 mW), laser class 3B
 - Diode laser (561 nm, 10 mW), laser class 3B
 - Diode laser (640 nm, 5 mW), laser class 3B
- Fluorescence filter sets:
 - Filter set 38 eYFP
 - Filter set 43 Cy3
 - Filter set 49 DAPI
 - Filter set 50 Cy5
- Plan-Apochromatic objectives:
 - 5x / 0.16 M27
 - 10x / 0.3 M27
 - 20x / 0.8 M27
 - 40x / 1.3 Oil DIC M27 y 40x of water and glycerol
 - 63x / 1.4 Oil DIC M27
 - 100x / 1.4 Oil DIC M27
- Microscope inverted stand: Axio Observer 7

Manufacturer: Zeiss

Model: LSM 800

www.ibecbarcelona.eu/corefacilities | microscopy@ibecbarcelona.eu

Aquest equip ha estat col·locat en un 80% pel Fons europeu de desenvolupament regional en el marc del Programa operatiu FEDER de Catalunya 2014-2020

2. Incorporation of innovative elements.

Thanks to this action, three new research groups have joined IBEC. These groups have such innovative research lines as an “organ-on-a-chip” that could be used in clinical trials; “biological controllable nanodevices” to improve the administration of therapeutic agents in specific places of illness, and the developing of technological tools to inspire perspective, cognitive and affective systems and motors of the brain to help in the functional recuperation after neurologic damage.

Various microscopes have been purchased, which are one of the most important tools for the cellular and molecular biology research, among them there is a state-of-the-art microscope – High-Resolution Microscope – that enables to visualize cellular structures and molecular activities in a resolution that cannot be achieved by a conventional microscope

3. Adequacy of the achieved results of the operation and the established objectives.

The Institute for Bioengineering of Catalonia is configured as a world-leading research center focused on the interdisciplinary research, which contributes to creating knowledge, the improvement of health and quality of life and the generation of wealth.

With these new conditioned spaces, as well as with the acquired equipment, the Institute can contribute, through its research, to achieving objectives as valuable as the early diagnosis, the new therapies based on regenerative medicine, the improvement of the quality of life regarding the population ageing, and the technology advances that increment the efficiency and the possibility to make sustainable the sanitary assistance.

Both in the spaces of the Barcelona Science Park and the Campus Diagonal-Besos, three new research lines have been incorporated that will lead IBEC to achieve the aforementioned objectives. Concretely, these lines are working in **Biosensors for Bioengineering**, which aims to integrate the biosensors technology and the nanotechnology with the investigation of stem cells and tissue engineering, **SPECS** (Synthetic, Perceptive, Emotive and Cognitive Systems) are using synthetic methods to study the neuronal, psychological principles and the behavior that capture the perception, emotion and cognition, and finally **Targeted Therapeutics and Nanodevices**, which are dedicated to the study the biological mechanisms which govern the way how our cells and tissues transport the loads to a special place into our body, applying this knowledge to the sketch of nanodevices to improve the administration of therapeutic agents in specific places of illness.

4. Contribution in the resolution of a problem or local weakness.

The ageing of population is a fact in our society. The low birth rate and the increase of life expectancy contribute to creating a society with a higher average age. For this reason, one of the current challenges is to search for solutions that ensure the people's well-being and an independent lifestyle as people grow up.

The Institute for Bioengineering of Catalonia which is formed by multidisciplinary research groups, experts in nanotechnology, biology, and ICT (Information and Communication Technology). has the purpose to provide solutions in the area of nanomedicine and tissue engineering applied on the development of advanced therapies, that will allow the improvement of quality of life to citizens of all ages, and in addition, to bring research closer to all citizens the personalized medicine and also a paradigm shift, contributing to the visibility and sustainability of the public health system in Catalonia.

5. Degree of coverage on the target population.

With this action the Institute for Bioengineering of Catalonia will be able to make a major contribution to searching solutions to improve the quality of life of the Catalan population, also making possible to undertake a national and international expansion in the future of the improvements developed on the research field, as well as, the methods for the early illness diagnosis, allowing the possibility of identifying the correct treatment for every affection and patient. In addition, it will lead to the development of more rapid treatments for infectious illness, complemented by agents to combat the antibiotic resistance. Likewise, it will be possible a better collection, analysis, and treatment of the information to monetarize the health to the well-being and protection against the disease. Finally, it is going to allow us to define efficient strategies to repair the damage and to restore the functionality, adding the regeneration of tissues, advanced prosthesis, and robotics. Ultimately, the adequacy of spaces and the procurement of new equipment will undoubtedly allow all these advances to reach the highest number of people, covering a larger population who will be benefited from the progress highlighted above

6. Compliance of the horizontal principles (sustainable development, equality between men and women, the principle of no discrimination) and the environmental law.

On 16th of April 2015, IBEC was awarded with the prize "HR Excellence in Research" organized by the European Commission. This award reflects the commitment of continually improving IBEC's Human Resource policies, accordingly with "The European Charter of Researchers and The Code of Conduct for the Recruitment of Researchers". In these documents, created in 2005 by the European Commission, rights and duties both for researchers and staff are described, and it represents a contribution to the creation of a transparent, attractive and open labor market to researchers from all over the world, moreover, to convert the scientific research in an attractive professional career.

In 2014 IBEC launched the first Equality and Diversity pPlan, which has been developed between 2014 and 2016. In 2017, the second Equality and Diversity Plan (2017-2019) is published. The

intended objectives, as part of IBEC's values, are the equal treatment and opportunities for all, the elimination of gender-discrimination and to foster an environment where everyone feels respected, valued and where the inclusion culture is promoted. The current Plan (2017-2019) contains the amount of 34 measures and it reflects the spirit of continuous improvement of identification and adoption of best practices which promote the equality of opportunities and gender diversity.

This project complies with the current legislation on protection, conservation and improvement of the environment. Sustainability is one of the singularities of the Campus Diagonal-Besos, currently comprising three buildings, has been built with [environmentally friendly](#) materials and machines,, adding to this building complex an excellent energy performance.

In addition, work has been carried out in order to achieve the suitable thermal insulation and acoustic protection. Furthermore, it incorporates a light system with high efficiency resulting in a more sustainable project

7. Synergies with other political or public intervention instruments.

The adequacy and setting up of laboratories involves the incorporation of new research groups in IBEC, creating strong synergies at a national and international level.

Nationally, it has created synergies with different projects, among which highlights the MINECO project (RDIP project with MINECO financial support) in its modality "Research challenge: Intelligent system and autonomy of neurorehabilitation", showing complementarities with the State Programmes of promotion of Scientific Research and Technical Excellence.

Furthermore, we can emphasize the synergies with the Generalitat of Catalonia, with the accreditation of TECNIO label, which identifies the Catalan entities that develop and provide technology to companies.

Internationally, the synergies come from hand in hand with different European projects collected by the European Research Council (ERC), among which highlights projects as, "The role of consciousness in adaptive behavior: A combined empirical, computational, and Robot-Based Approach" and the "Diabetes Approach by Multi-Organ-on-a-Chip" (the devices of the organ in a chip offer new approaches for the modeling of disease and drug discovery), the program "Future and Emerging Technologies (FET)" which invests in a new research and cutting edge innovation with a potential high impact in technology, for the benefit of our economy and society, or the project "Sensory-Motor Contingencies", as part of the programme H2020, that tries to make the robots more socially competent due to their higher presence in our society.

The synergies obtained at a national and international level incorporating new research groups allows the possibility to work together, achieving excellent results.

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