

Una manera de hacer Europa



BUENAS PRÁCTICAS

Operaciones Cofinanciadas

**“Real-Time Microwave Imaging
Device for Endoscopic Explorations
and Interventions (MiWEndo)”.**

**Agencia de Gestión de Ayudas
Universitarias y de Investigación
(AGAUR)**

Programa Operativo de Cataluña

Fondo Europeo de Desarrollo Regional

Año 2018

Se presenta como Buena Práctica el proyecto: “Real-Time Microwave Imaging Device for Endoscopic Explorations and Interventions (MiWEndo)”.

Real-Time Microwave Imaging Device for Endoscopic Explorations and Interventions (MiWEndo) is a transfer project developed by the Pompeu Fabra University (UPF) in collaboration with the Clinical Hospital and the Polytechnic University of Catalonia (UPC), that is aimed to valorize and translate research on microwave imaging to the clinic and the industry. The proposed project involves different stages of the technology pipeline, including knowledge/technology protection, pre-prototype design, initial manufacturing and testing. The proposed device will be a small endoscope head composed by several radio frequency (RF) sensors that will allow to form cross-sectional both anatomical and functional images of the interior of the gastro-intestinal tract as the endoscope travels along it.

The project had a total cost of 24,000 euros, an eligible cost of 20,000 euros and an ERDF grant of 10,000 euros. Finally this operation has involved 7 researchers in the project (3 women and 4 men).

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

1. High dissemination among beneficiaries, potential beneficiaries and general public

The execution of the project and its results have been widely disseminated through different means and channels but eminently digital for its ease, low cost and high impact. Attempts have been made to make the maximum possible dissemination internally or from the UPF, for example through the website¹ of the research group responsible for carrying out the project, the Knowledge Portal² (a technological showcase of the university that helps us to make it visible Research with economic potential within the business environment) and from the news section of the UPF's institutional website³.

¹ <https://bcn-medtech.upf.edu/>

² <http://knowledge.upf.edu/patents/medical-device-based-microwave-technology-prevention-and-diagnosis-diseases-reftec0125>

³ https://www.upf.edu/web/e-noticies/inicio/-/asset_publisher/wEpPxsVRD6Vt/content/id/2669414#.WQHQRtKLTct

» / Projects


Projects

BCN MedTech has already participated in more than 100 R&D projects

Below are the descriptions of a few finished and on-going projects.

Highlighted Projects

eAXON




Electronic AXONS: wireless microstimulators based on electronic rectification of epidermically applied currents

We propose to explore an innovative method for performing electrical stimulation in which the implanted microstimulators will operate as rectifiers of bursts of innocuous high frequency current supplied through skin electrodes shaped as garments. This approach has the potential to reduce the diameter of the implants to one-fifth the diameter of current microstimulators and, more significantly, to allow that most of the implants' volume consists of materials whose density and flexibility match those of neighbouring living tissues for minimizing invasiveness.

HOLOA

MIWEndo




Real-time microwave imaging device for endoscopic explorations and interventions

This project is aimed to valorize and translate research on microwave imaging to the clinic and the industry.


The proposed project involves different stages of the technology pipeline, including knowledge/technology protection, pre-prototype design, initial manufacturing and testing. The proposed device will be a small endoscope head composed by several radio frequency (RF) sensors that will allow to form cross-sectional both anatomical and functional images of the interior of the gastro-intestinal tract as the endoscope travels along it.

This project is co-financed by FEDER Funds (2014-2020) from the European Union.

 **Unió Europea**
Fons Europeu de Desenvolupament Regional

Cardio-unXion


Compilaa0



Computational tools for investigating the morphology and blood flow dynamics after left atrial appendage occlusion interventions in atrial fibrillation patients

The main objective of the COMPILAAO project is to develop advanced computational tools to characterize the 3D morphology and investigate the blood flow dynamics after LAAO interventions to improve our knowledge about the pathophysiological mechanisms involving the LAA and how this is modulated by the intervention.

VP2HF



In the spaces where the actions included in the project have been carried out, the relevant posters with the appropriate logos have been used.



As far as the external disclosure has been counted on different publications as they can be articles to the Periódico⁴ (newspaper that had more than nine million unique users in its digital edition last January of 2,017⁵), in the blog of the Clinical Hospital of Barcelona⁶, the

⁴<http://www.elperiodico.com/es/noticias/ciencia/microondas-upf-para-mejorar-precision-colonoscopias-5718666>

⁵<http://www.elperiodico.com/es/noticias/sociedad/periodico-bate-record-historico-audiencia-digital-5849868>

⁶<http://blog.hospitalclinic.org/es/2017/01/la-dra-fernandez-esparrach-en-el-equipo-de-investigacion-para-la-mejora-de-la-precision-de-las-colonoscopias-tradicionales/>

Farmacosalud⁷ portal and the institutional profile of the UPF on Twitter⁸ (with more than 23,000 followers).

2. Incorporation of innovative elements

This project aims to bring innovative microwave technology in clinical endoscopy, and especially to colonoscopy. We want to create a unique infrastructure based on a miniaturized microwave device accessory to a conventional colonoscope and information processing methods, which combined with the endoscopic image, improve the detection rate of polyps and allow in-vivo diagnosis.

Colonoscopy is the most effective method to detect polyps and the only one that allows them to be resected, and therefore prevent the onset of colorectal cancer. However, the rate of undetected polyps is currently 22% and after a negative colonoscopy, the risk of developing cancer is 60-70%. The main causes of this poor performance are the reduced field of vision of the camera and the concealment of polyps due to the angulations and folds of the colon and poor cleaning of the same.

Microwaves are capable of generating images without restriction of the field of view (360°) and penetrate opaque tissues into the light, and therefore reduce concealment problems. In addition, they are able to provide in-vivo diagnosis, that is, differentiate between the normal colon, polyps and cancer, thus helping doctors make decisions during exploration.

Finally, the technology is inexpensive and the radiation is non-ionizing, thus being safe and without side effects for the human body. In conclusion, microwaves have great potential as a method for the diagnosis, monitoring and population screening of cancer. Several research groups around the world are working on the development of microwave imaging techniques for the early detection of breast cancer and stroke, but this is the first time microwaves have been proposed for the detection of polyps within the colon.

3. Adaptation of the results obtained from the operation to the established objectives

Colorectal cancer (CRC) is a serious and growing health problem in countries with a Westernized lifestyle. CRC is a major cause of morbidity and mortality worldwide, with more than 1.3 million new cases per year⁹. It is the second most deadly cancer in men and third in women.

Colonoscopy-based screening is not only capable of detecting cancer early, but also prevents the disease from developing through the detection of pre-cancerous polyps and their resection.

However, colonoscopy is far from perfect since 22% of polyps are not detected and the risk of cancer after a negative colonoscopy is as high as 60-70%. Lack of effectiveness is attributed to viewing limitations and lack of quantitative information during the scan.

Thanks to the implementation of this project has been able to validate technologically the initial idea of the research group and is that the use of microwave to colonoscopies allows

⁷ <http://farmacosalud.com/el-innovador-miwendo-bueno-bonito-y-barato-la-hora-de-mejorar-las-colonoscopias/>

⁸ <https://twitter.com/UPFBarcelona/status/808281002246217728>

⁹ <http://www.crcprevention.eu/index.php?pg=colorectal-cancer-epidemiology>

differentiating healthy tissue from what is not and thus drastically reducing the number of Polyps not detected. We can say that the established objectives have been achieved.

The receipt of European funds has had a clear incentive effect for the project because without them it would not have been possible to do so thanks to the financing of 100% of the eligible expenses. In addition, they have made it possible to carry out training for high-value-added researchers who would otherwise not have done so, regardless of having found other funding.

4. Contribution to the resolution of a problem or regional weakness

In Catalonia, the Department of Health has established the Early Detection Program for Colon and Rectum Cancer¹⁰ and in 2011 the first round of screening began with the participation of 80,000 people. This first round allowed to detect and treat early 343 cancer patients and 1,973 with polyps at risk of becoming malignant. Experts say that the program could reduce mortality by up to 35%.

Unfortunately, there is a delay in the implementation of this program since only 23% of the target population (ages 50-69) is being screened. There is currently a lack of resources in the hospital system that makes it unable to take over more than 30,000 additional colonoscopies each year directly related to the program¹¹.

The results obtained at the end of this project allow solving these problems to a great extent, since thanks to the incorporation of the technology now validated, the colonoscopies can be carried out faster and it will not be necessary to repeat so many. This means that with the same resources available, it will be possible to attend more patients and increase the percentage of development of the Early Detection Program for Colon and Rectum Cancer.

5. Degree of coverage of the target population

As mentioned in the previous point, in case the technology developed finally reaches the market will have a great impact on the Catalan population in general. As of January 1st 2016 in Catalonia, there were 1,786,769¹² people aged between 50 and 69 years old, who must undergo the screening tests established for the Early Detection of Colon and Rectum Cancer. Therefore, it can be said that the action directly affects 24% of the Catalan population.

These are only the direct effects but we can assume a whole series of indirect effects that will surely have a positive impact in Catalonia thanks to an improvement in efficiency in the provision of the public services that are increasingly necessary for a population that It ages year after year.

As far as Catalonia is concerned, in Spain as a whole there are 11,451,288¹³ people within the same age group (also 24% of the total population) and an estimated 2,031 there are 14,019,268 (30% of the total). For the other countries considered as developed economies the estimates are that there are 291 130 280¹⁴ (24% of the total).

¹⁰ <http://www.preveniocolonbcn.org/index.html>

¹¹ http://www.ara.cat/premium/societat/deteccio-precoc-cancer-arriba-catalans_0_1256274415.html

¹² <http://www.idescat.cat/pub/?id=aec&n=253&lang=es>

¹³ <http://www.ine.es/prensa/np994.pdf>

¹⁴ <http://stats.oecd.org/>

6. Fulfillment of the horizontal principles (sustainable development, equality between men and women and principle of non-discrimination) and environmental legislation

As for compliance with some of the horizontal principles and environmental regulations, just comment that in terms of gender issues the project is led by Marta Guardiola, a researcher at the university since 2.014. As for the selection of the other persons who have participated in the execution, the principle of non-discrimination has been maintained for reasons of gender, origin or any other.

7. Synergies with other policies and instruments of public intervention

We do not know if the action may have reinforced the performance of other funds as well as if it has contributed to enhance the positive effects if it has been so.