

SPOTLIGHT ON CATALONIA

Staying a steady course through the storm

Catalonia weathered the financial crisis that hit Spain hard, and kept its research metrics in surprisingly good shape. How did it do it?

By Anna Petherick

AROUND THE turn of the century, Catalonia, a semi-autonomous region in the far northeast of Spain, went to great lengths to grow high-quality science within its borders. It offered generous salaries and tenure to elite researchers from across the world, and built several state-of-the-art research facilities. “From 2000 to 2008, there were amazing increases in public funding of research — something like 10% a year,” says Josep Martorell, the Catalan government’s director of research from 2011 until February of this year. Those efforts were bearing fruit, and Catalan science was looking forward to the years ahead.

Then, the global financial crisis hit, and it hit hard. Shortly after Lehman Brothers declared

bankruptcy in September 2008, Spanish unemployment figures showed a 40% rise on the previous year. In the spring of 2012, unemployment hit 24% — double the Eurozone’s average — and Bankia, the country’s biggest mortgage lender at the time, asked for a bailout.

Spain was forced to make drastic spending cuts year after year. It reduced the research and development budget by 39% over five years, and instituted new fiscal policies, such as a nationwide ban on hiring new professors to replace those who retired. “In these last six or seven years, we’ve suffered probably the biggest ever crisis in terms of public funding,” Martorell says.

Catalonia felt the squeeze. The regional government — and Catalan

research institutions — braced themselves for bad weather, and waited for more bad news.

But Catalonia’s research metrics hardly faltered. Output in terms of peer-reviewed research papers held strong. So did Catalonia’s positions in major international rankings of universities and research institutes. If anything, they improved. In fact, Catalonia weathered the storm far better than the rest of Spain. Between 2007 and 2015 it obtained 180 European Research Council (ERC) grants — more than Spain’s other 16 regions put together. “We’ve been especially successful if you compare us on the basis of our population size,” says Josep Taberner, director of the Vall d’Hebron Institute of Oncology (VHIO) and head of the Medical Oncology Department at the Vall

“The crucial thing that guaranteed resilience was to focus policies on people, not on projects.”

Arcadi Navarro, Secretary for Universities and Research, Catalonia

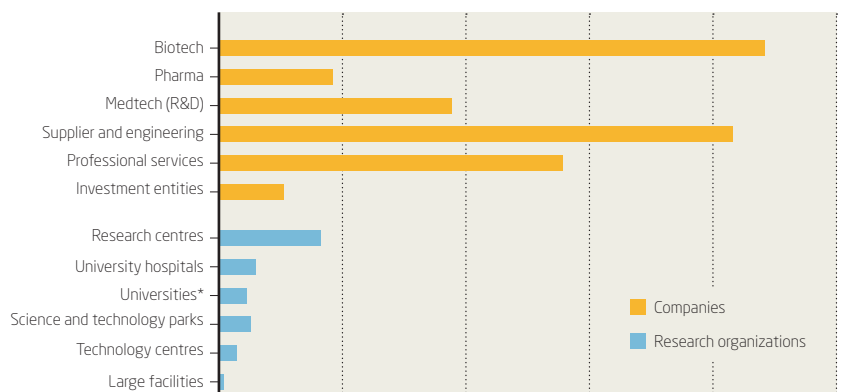
CATALONIA BY NUMBERS

These data are from Biotac, a governmental foundation that aims to promote and support bioscience in Catalonia to boost growth in the region.

Bioscience organisations in Catalonia

In total, 734 companies and 89 research organizations operate out of Catalonia.

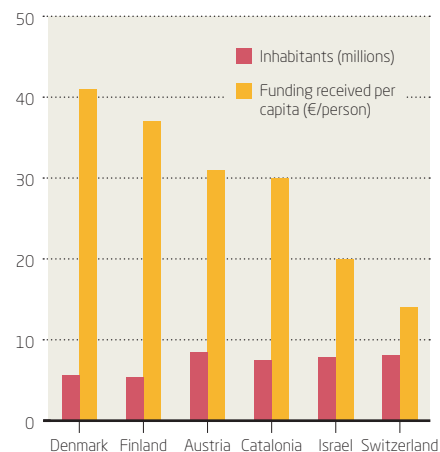
INFOGRAPHICS: MOHAMED ASHOUR



*Offering life sciences students

Funding

Catalonia compares well with similarly-sized regions in the European Research Area.



d'Hebron University Hospital, both in Barcelona. On that basis, he explains, Catalonia is fourth for ERC projects after Switzerland, Israel and the Netherlands.

People not projects

Understanding Catalonia's success requires a rear-view mirror. Back in 2001, the Catalan government started ICREA (the Catalan Institute of Research and Advanced Studies), which sought to attract extremely accomplished researchers by making them professors for life with internationally competitive salaries. This policy worked in concert with new research centres, which were focused on key areas such as genomics, photonics and supercomputing, to rapidly improve the quality of the region's research output.

So when the storm arrived, Catalonia already had some strong buffers in place — all it needed to do was maintain them. The regional government kept its research funding constant, even increasing it a little for ICREA. As such, the research centres continued to draw talent, and maintained efforts to cement collaborations with each other, including founding BIST (the Barcelona Institute of Science and Technology) to coordinate their efforts.

ICREA continued to recruit professors. "Fewer jobs were advertised [during the financial

crisis], but that was exactly what we had planned for the years before the crisis," explains Jaume Bertranpetit, the head of ICREA from 2007 until 2015. The only way that ICREA felt the financial crisis, he says, was during interviews of potential recruits. "They're normally an hour long, but we had to make them 90 minutes because everybody asked the same questions: 'is the crisis going to crash the country? Is it going to crash research?'"

There was a persuasive logic behind the decision to protect ICREA. In a time of fiscal crisis, when national research grants were withering, most researchers had no alternative to hoping things would improve. But, the most talented could compete for international funding.

On realizing how much the Spanish research budget was to be cut, ICREA's 250 elite professors started switching strategies, directing more of their funding efforts towards the European Commission and the United States' National Institutes of Health. This worked out: as the money from Madrid dried up, the funding attracted by ICREA professors surged. This has helped to augment ICREA's prestige: Sandra Brucet, a Catalan aquatic biologist who has worked in Norway, Italy and Denmark, held ambitions to become an ICREA research

professor long before she was hired. "I knew that an ICREA position would be difficult [to get]. But this was clearly my goal. I wanted to work abroad, but I always wanted to come back," she says.

"The crucial thing that guaranteed resilience was to focus policies on people, not on projects," says Arcadi Navarro, who recently took up the position of secretary for universities and research in the Catalan government. "When the money runs out, you have to stop funding those projects. But if you bring in people who are among the best in their respective fields, they are skilled enough to go and get the money elsewhere in the world. If we hadn't selected these kind of people — flexible, smart — we would not have been able to handle the crisis so well."

Innovating into the future

Of course, Catalonia didn't walk out of the financial crisis unscathed. There was little spare cash, for example, to plough into policies that might encourage more technology transfer. Private companies in the Barcelona area lowered their internal spending in research and development — as with elsewhere in the world. But some progress was made. High-tech spin-off companies with participation from ICREA professors have raised more than €85 million since 2010, says Antonio Huerta, ICREA's current director. That may not be much next

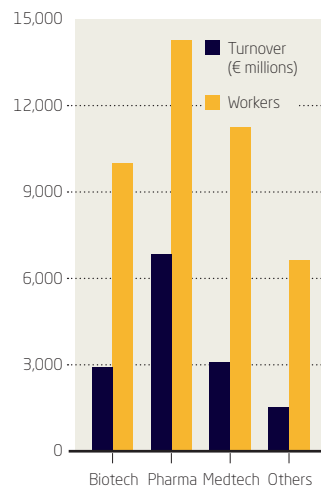
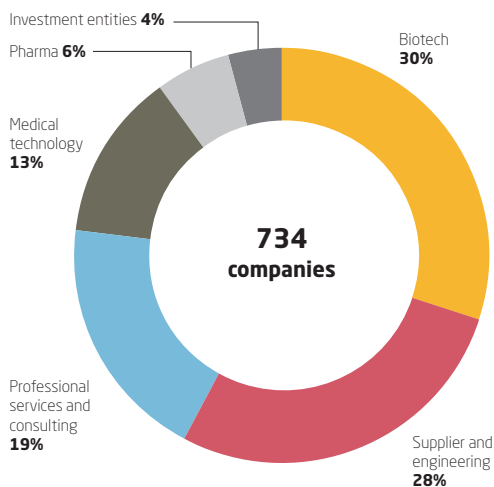
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Josep Taberner, director, Vall d'Hebron Institute of Oncology

CATALONIA BY NUMBERS

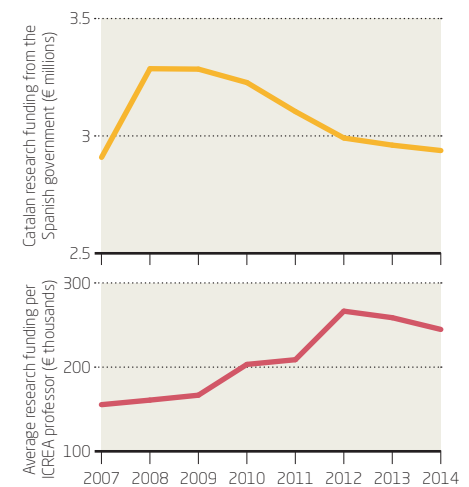
Company breakdown

Seven percent of Catalonia's GDP comes from the region's bioscience companies, and most of that comes from biotech, pharma, and medtech.



ICREA professors keep themselves funded

As Spain cut its research budget during and after the financial crisis, ICREA professors started to look for external funding sources, such as the European Commission.





The Barcelona Supercomputer Center's flagship supercomputer – MareNostrum – at the Polytechnic University of Catalonia. The centre was established in 2005, and is located in a former chapel.

to Silicon Valley, but it's €85 million more than the €0 raised in the ten years prior.

One particularly promising initiative, known as the industrial PhD program, was carbon-copied from Innovation Fund Denmark. In the last few years, the Catalan government has shared about 250 PhD projects with private companies in a dual-supervision arrangement, cutting state costs in half and creating a cohort of skilled young researchers with demonstrable industry experience. The first of them have already graduated.

There's more to it, though. The industrial doctorate projects often spark extensive and enduring

relationships between universities and companies that go far beyond the student. "There are a lot of new agreements signed this way. The industrial doctorate becomes just another reason for the [university] researcher and the company to meet. The programme is interesting, but more interesting is what happens after."

Martorell's new place of work — the Barcelona Supercomputing Center — has taken advantage of the versatility of its technology, and created a department devoted to industry collaboration. The centre has done a lot of work on simulating fluids, which has opened the door to all kinds of industrial partnerships, says Martorell. Recently it has

developed biosimulations of entire tissues or even organs, which have enabled pharmaceutical companies to test a drug's delivery virtually. Similarly, the VHIO, where Tabernero works, is offering a model to other research institutes in the region; its board has more members from the private sector than the public sector, which helps to continuously guide its research towards societal applications.

There's little doubt that the next stage of Catalonia's research development requires the government to foster even more public-private partnerships. And now that the economic tremors of the financial crisis are drawing to a end, the scope of this could

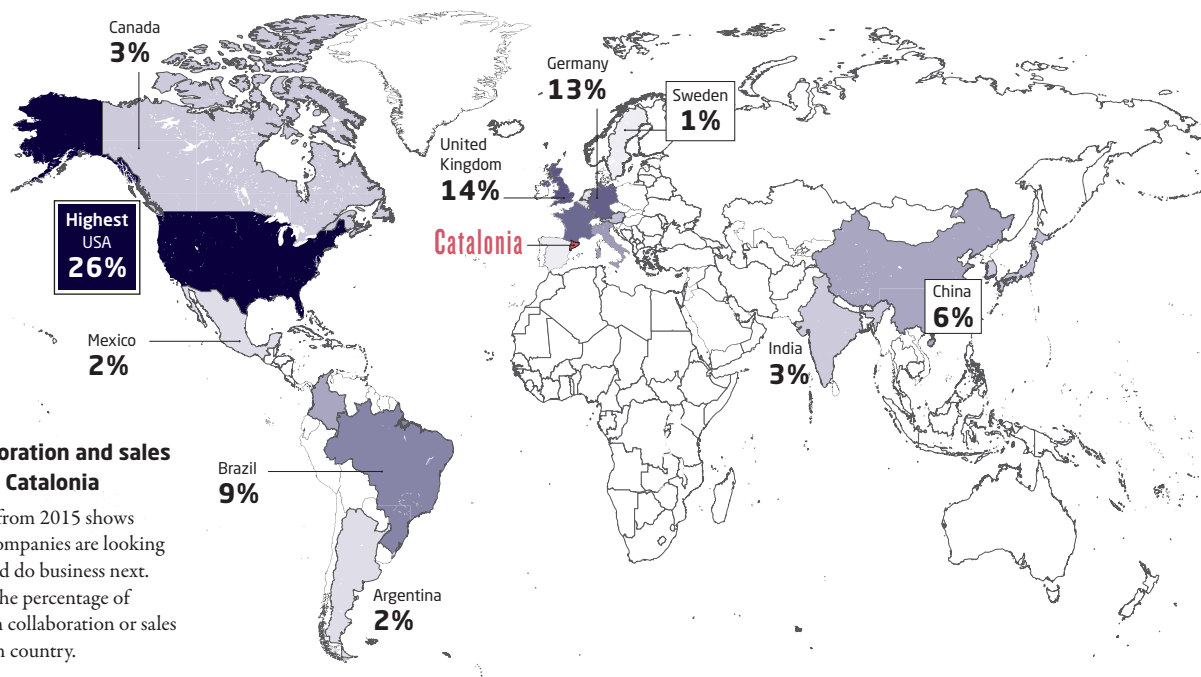
increase — though some worry that political reverberations may delay for a while longer. Since elections last December, Spain has spent most of 2016 without a stable national government, a situation that has strengthened already-clamorous calls for Catalan independence. It has also made it harder for researchers to plan projects far ahead, says recent ICREA appointment, Eva Anduiza, a political scientist at the Autonomous University of Barcelona.

But not everyone is worried, especially when the current political uncertainties are put in context of everything the region has done to grow its research over the years and to weather the financial crisis. "What happens in political terms is important, of course, but the most important thing is that we have a state that is sensitive to innovation," says Martorell. "And that can happen in or out of Spain."

Indeed, the days of Catalonia looking outwards for a prosperous research strategy have come full circle. Navarro, fresh from hosting a Polish delegation, says it's far from the first time that foreign government representatives have visited. "They keep asking us what our secret is."

This content was commissioned and edited by the Naturejobs editor

CATALUNYA BY NUMBERS



Future collaboration and sales interest from Catalonia

A Biocat survey from 2015 shows where Catalan companies are looking to collaborate and do business next. The map shows the percentage of respondents with collaboration or sales interest in a given country.



:insideview

profile feature



Aleix Prat, MD, PhD, Head Medical Oncology Department, Hospital Clinic, Barcelona

Clinical research in oncology typically requires large-scale, multi-institutional networks of hospitals — and for breast cancer trials in Southern Europe, coordinating those studies often falls to SOLTI, a non-profit organization with more than 20 years of experience in running clinical investigations in Spain, Portugal, France and Italy. SOLTI is always looking to the future, whether it's through scientific advances that could change cancer care or through annual scholarships that help train the next generation of physician-scientists. Dr. Aleix Prat, head of medical oncology at the Hospital Clinic in Barcelona and the scientific committee coordinator for SOLTI, discusses why such an international collaboration is needed to make progress in the treatment of breast cancer.

Q: What does SOLTI enable that wouldn't be possible without such a network?

Breast cancer is not one disease. There are many different subtypes — at least four and probably more — and as we're running more complex trials and we're selecting patients based on the molecular characteristics of their tumors, we need to join forces to find patients or we're just not going to be able to run any trials. Our main objective is to bring together different specialists from approximately 60 hospitals who are involved in the treatment of breast cancer. We have them work closely with our SOLTI professionals, who have diverse backgrounds and roles in medical, scientific, operational, and financial affairs. And then we meet and think about new ways to improve patient outcomes. In this way, SOLTI acts as a sort of filter of ideas, so we only run the best trials that are going to make a difference in the lives of breast cancer patients.

Q: What's an example of a SOLTI trial that has changed clinical practice?

Perhaps the best example of SOLTI's impact can be seen today in the treatment of women with HER2-positive breast cancer. SOLTI played a major role in the clinical trials that led to approval of the HER2-targeting drug Herceptin. This is probably what the network is best known for today.

Q: What makes SOLTI unique from other kinds of cancer trial networks?

At least one feature that's different about SOLTI is the fact that it integrates a lot of translational science behind our clinical trials. So, when doctors run a trial, the question is usually: Does the drug or treatment work? But at SOLTI, we always try to gather samples, either from the tumor or from the blood, and then run scientific studies so we can advance our

understanding of the disease by, for example, identifying additional biomarkers that will help us make better treatment decisions. We have a very good network of labs with the expertise to make sure this happens. SOLTI is also very open and inviting. We have a scientific committee and anybody can bring us an idea. If we like the idea, we try to collaborate either with pharmaceutical companies or with other academic cooperative groups to get that trial funded and off the ground. It's only by uniting our efforts that we'll be able to address unmet medical needs for our patients.

Q: You lead a translational genomics lab at the August Pi i Sunyer Biomedical Research Institute (IDIBAPS) as well a medical oncology department at a major Spanish hospital. Why did you want to take on the job coordinating SOLTI's scientific initiatives as well?

Too often, the oncology community is really split between physicians on the one side and researchers on the other, and we need to find this place in the middle where we both see patients and, at the same time, go to the lab to understand what's happening in their disease. I'm deeply committed to this approach and I'd like to see more people enter this kind of translational research paradigm. SOLTI can help make that happen, and this position allows me to move that forward. Plus, the fact that I can start with an initial idea from the clinic, run a clinical trial and then get new scientific insights, for me, is extremely rewarding, because it means we're making progress.

Q: How does SOLTI help with career development for young clinicians who are interested in breast cancer research?

This is very important for us. We need new people with new expertise, so it's

critical to attract young investigators. Our commitment to seeding the future of breast cancer research led us to launch the Young Researchers Program more than two years ago. This program has two parts: First, there are workshops that we organize where we try to teach the basics of running a clinical trial — the statistics, the ethics, even legal issues. And then we have a one-year grant in which we finance the salary of an early-career investigator who has just finished a fellowship in medical oncology, giving that person the opportunity to go work in one of the big research hospitals in Spain and be a part of the SOLTI team. It's not easy now for clinicians to enter research, and I think SOLTI can really help these young physicians understand how clinical research operates, with mentoring from many leading experts.

“

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Q: Do you see this kind of training paying off?

Absolutely. The Young Researchers Program has proven to be a great way to attract these future investigators, get to know them, understand their motivations and start a relationship. Nowadays, we're seeing that many of SOLTI's new members are quite young, and this is reflected even on the scientific committee where the majority is below the age of 45. I'm only 37! I think it's great. We need to make sure that these young medical oncologists do research because, if not, it's going to be difficult to move forward in this field.

Our **Talent program** is committed to the future of breast cancer research by supporting **early-career investigators**, providing them with a comprehensive training program in clinical research:

- **Personalized career development for one year**, including:
 - Rotation in a hospital from our network under the mentorship of a senior SOLTI investigator.
 - **Hands-on experience in clinical protocol development & study conduct in our headquarters office.**
- **Access to SOLTI** educational events, including workshops in clinical trial design & biostatistics.
- **Attendance to an international professional conference.**
- **Stipend** to cover living expenses.

SOLTI is a non-profit organization with **more than 20 years of experience** in conducting **innovative clinical & translational studies** in the field of **breast cancer research**.



:insideview

profile feature

Josep Rodiera, Head of Anesthesia Department of Centro Médico Teknon, Barcelona

Under the concept of perioperative medicine, anesthesiologists, working with new technologies and new devices, will have more control of a patient's care before, during, and after surgery. The approach will make for more personalized, safer care, and it could transform the practice of anesthesiology.

The stereotype of an anesthesiologist with a stethoscope around his neck could soon be replaced by a doctor, in the operating room, wearing augmented reality glasses while networked to every device in the room.

Dr Josep Rodiera, a MD and PhD, anesthesiologist, with a master's degree in bioengineering, heads the anesthesiology department at Centro Médico Teknon, a leading private hospital in Barcelona, Spain, and part of the Quirónsalud medical group Fresenius-Helios.

Q: How is anesthesia evolving?

Most consider the anesthesiologist as the person who puts patients to sleep and wakes them up. But the practice of anesthesia is expanding. As a cross cut-specialty, anesthesia is uniquely positioned to lead the development of 'perioperative medicine' — that means preparing the patient for surgery and taking care of them throughout the procedure.

Q: How do you prepare patients before surgery?

A concept that is changing is that the patient has to be an active participant. As an athlete should be prepared for a marathon, so the patient should be prepared for surgery. That may mean eating enough protein, not smoking, doing some physical activity, and using some apps to train their brain. For example, there can be problems with the cognitive reserve of people over 55 or 60 in the post-operative period. Playing some Sudoku or with an iPad trains your brain, so you can have more cognitive reserve.

Q: How does information technology enter in this perioperative process?

Our perioperative approach aims to integrate all actions in a program through custom-made software. It makes possible a safe and efficient data transmission and a greater traceability from pre-anesthetic evaluation to patient discharge.

Q: And what happens in the operating room?

In the intraoperative phase, based on our own SAM — Smart Anesthesia Management-concept created by the University of Washington, we are implementing a pilot

project that aims to interconnect all the devices that interact with the patient.

This system will be able to predict possible situations that could arise. It catches information from the electronic patient record and the monitoring of the patient. It can identify which patient is in the operating room and what we are doing with the machines. For example, when we put a patient under anesthesia, our target is a sleeping patient, but, when we are bringing them out our target is an awake patient. The system could recognize that and automatically change alarms. If the patient is recovering from the anesthesia and we forget to do something or the patient is not ready to wake, our SAM could recognize that situation and send a message to the anesthesiologist saying: "You cannot wake the patient because ...".

This SAM will have the knowledge of thousands of anesthesiologists and will be based on the experiences of thousands of patients in similar situations with similar characteristics to the patients in our operating room.

Q: How do you bring IT and anesthesia together?

It is necessary to have a multidisciplinary group: physicians, nurses and, increasingly, biomedical engineers. An example of the value of this extraordinary team's contribution is the development of a special software to manage preoperative care and anesthesia planning.

With their contribution, we would like to develop an easy programming language, based on the principle of IFTTT (If This, Then That) with the idea that anesthesiologists

can use words that are commonly used in medicine, programming their own alarms or their own recommendations into the SAM. We have this in our pilot project with our own patients, but the result is that in the future many anesthesiologists can add their own knowledge to the system. We can share data and information about our patients to improve the experience in the operating room. That really makes the patient safer.

Q: How do you manage all this?

We have a lot of machines in the operating room and you need to have some device to communicate between them. Augmented reality devices, such as Google Glass, are easy and comfortable to wear in the operating room, and they place critical information in front of your eyes. With them we are able to maintain continuous communication with the operating room devices. We believe that augmented reality could be something that in future we use commonly in the operating room.

Q: You've also invented something called a TOFCuff?

Yes, the TOFCuff is a device that can monitor the level of neuromuscular block. The neuromuscular block is a common practice in anesthesia. It makes the patient absolutely relaxed, so the surgeon has the best conditions to do the operation. Afterwards we have some medication to reverse the effect but is necessary to monitor that. I modified a standard blood pressure cuff and incorporated some electrodes inside so we can monitor the neuromuscular block. An advantage is that all anesthesiologists are trained to use a blood pressure cuff. This product now is selling in Europe, Japan and many other countries, and is pending FDA approval to be sold in the United States.

Q: How does all this change safety and the patient's experience?

We make a more personalized treatment for the patient and increase safety. Errors are minimized and the decisions we are making may be based on the experience of thousands of other patients. The care is tailored for that patient. It's not standard; it's specific to them.

Farewell to Traditional Anesthesia

Perioperative Medicine, surgical prehabilitation and new technologies are changing the way we work in operating rooms.



The Department of Anesthesiology is made up by a highly dedicated and specialized team of physicians, nurses, technologists, bioengineers and staff working together for patient welfare. Our continuous growth keeps attracting talent internationally.

“A multidisciplinary approach allows us to tackle complex biomedical innovation projects to make progress in the search for solutions to offer better health care”



Since the beginning of its activities, the Department of Anesthesiology at Centro Médico Teknon led by Dr. Josep Rodiera and Dr. Jesús Santaliestra, is committed to the continuous improvement in patient care and patient safety, aiming to provide the best quality health care and excellent personal assistance.

Centro Médico Teknon, Quirónsalud Fresenius-Helios group, is a leading hospital in the Spanish private health care sector

Centro Médico Teknon is run according to a rigorous culture of quality management aimed at providing the best treatment and patient satisfaction, with the highest standards of safety, all of which has earned it the prestigious accreditation from the **US Joint Commission International**.

With the support of **Fundación Quirónsalud** that actively promotes clinical research and innovation, health training programs and social action, the Department of Anesthesiology is able to develop its own innovation and educational activities.



“Our RD&I department is made up by physicians and biomedical engineers working together in new tools and processes that facilitate and help to improve the safety and quality of care”

From a treatment perspective, the Department of Anesthesiology performs more than 36,000 anesthetic procedures per year. This is clearly an achievement if accompanied by a better understanding of the need to improve, innovate and use new technologies to perform a better practice of medicine.



:insideview

profile feature



Núria Godessart, Head of Skin Biology and Pharmacology, R&D, Almirall

Almirall has grown into a mid-sized pharma company on the strength of successes in discovering, developing, and commercializing novel medicines. Now, Almirall is entering a new phase in its evolution, in which it is narrowing its focus on dermatology and rethinking its approach to external collaborations. Here, Dr. Núria Godessart, Head of Skin Biology and Pharmacology at R&D in Almirall, discusses what the changes mean for the company, its researchers, and its partners

Q: Where does dermatology fit into Almirall's strategy?

Dermatology is our main focus now, but we have been active in the area for a long time. In the last years we have strengthened our presence and portfolio of derma products with strategic acquisitions. We started in 2007 with Almirall Hermal, a dermatology company based in Germany. In 2013, the incorporation of the US-based company Aqua Pharmaceuticals gave us access to the world's largest pharmaceutical market. Last year, we acquired Poli Group and ThermiGen. As a result, dermatology was the main driver of sales at the company in 2015.

We now have a strong portfolio of dermatology products in all phases, coming from our internal R&D and recent licensing agreements.

Q: How would you describe the R&D culture at the company?

In Almirall we believe research and development is key for long-term success in this industry. We have a sound track record in R&D built on 40 years of experience.

Our R&D is guided by unmet medical needs and based on three pillars: science, innovation, and partnerships. We ultimately have to obtain products that are both valuable for the patients and commercially attractive and, to ensure this, we work very closely with our colleagues from Marketing.

We have three R&D centers in Europe - Spain, Germany and Switzerland - as well as R&D groups in our US affiliates. Our teams are composed of people from the different sites, and this means a combination of different skills and expertise. We complement our internal capabilities by establishing partnerships with public and private organisations, academic

research teams, and biotechnology companies all over the world.

Q: How is the R&D model at Almirall changing and why?

We are focused in optimizing the performance and the efficiency at our different research centres. To me this is being a fantastic experience since we can take advantage of the cultural differences, background, knowledge and we can get the best from everyone.

Another factor that had a significant impact in the way we work is the route of administration. Dermatological diseases can be treated by systemic (oral, injectables) or topical treatments. The topical route expands the approaches we can pursue in R&D. Besides new chemical entities, we are also working in reformulation and repositioning programs, which have shorter clinical developments. This helps to balance resources, time to market, and risks. In addition, it strengthens relationships within R&D, because the contribution of development teams occurs much earlier in the process.

Many skin disorders are visible and this has a huge impact on the quality of life of patients. We know we must listen, learn, and act upon patient needs better than we have in the past. This means factoring the patient voice into R&D from the very start, for instance by ensuring compounds are compatible with the most suitable formulation for a particular disease and body region.

Q: What plans do you have to grow your skin biology and pharmacology operation?

In our team, researchers are focused on understanding disease pathogenesis, identifying and validating ideas, compounds, and therapeutic targets, and contributing to research programs. We have an experimental dermatology section running functional models required for all preclinical activities.

Our goal is to be strong in translational research, to develop novel models, and to identify biomarkers and predictors of clinical efficacy. We aim to close the gap between preclinical work and clinical development. We need to access external talent and are creating a network of experts in academia and hospitals.

These activities are part of our ambition to

become excellent in derma R&D. We are making a lot of advances in this direction and are excited to see the way it progresses.

Q: What opportunities do you see to team up with partners?

Promoting and encouraging strategic alliances is an integral part of Almirall's business model. Traditionally in R&D we have collaborated on an ad hoc basis to increase our capacity, run research programs in areas where we had no expertise, or access experimental models. We will continue to do so, but are now also seeking scientific collaborations with groups of excellence and partnerships to access external talent, knowledge, and ideas. This will be achieved through open innovation initiatives that we will integrate into our organizational culture.

Q: Do you plan to join any existing collaborative initiatives?

Potentially. We are open to participating in collaborative European projects such as Innovative Medicines Initiative and Horizon 2020. Unfortunately, most of these initiatives are focused on diseases in therapeutic areas other than dermatology and we see few opportunities to participate.

The spirit behind these projects is appealing, though, so we are thinking creatively about how we can translate the approach to dermatology. One option could be to team up with other derma companies for precompetitive collaborations on areas of shared interest.

Q: What programs or areas of skin biology and pharmacology do you see as particularly promising?

We think that innovative drug repositioning is an exciting opportunity. We are currently exploring and integrating different repositioning tools and developing good experimental models to test the molecules emerging from them.

Our therapeutic focus is mainly composed of immune-inflammatory dermatoses like acne, rosacea, psoriasis, and atopic dermatitis. Orphan diseases are also an area of special interest for us. In fact, we have two orphan drugs in clinical development, a proprietary compound for pemphigus vulgaris and a product licensed from Patagonia for congenital ichthyosis.

“We provide valuable medicines and medical devices to you and future generations”



Almirall is a global company based in Barcelona dedicated to provide valuable medicines and medical devices through our R&D, agreements and alliances. Our work covers the whole of the drug value chain. A consolidated growth allows us to devote our talent and efforts towards specialty areas and particularly to further grow as a leading Dermatology player. We are a specialist company, enabling us to accomplish the purpose of providing our innovative products wherever they are needed.

[We are working today for better health tomorrow](#)



Solutions with you in mind

www.almirall.com



Health

EIT Health Spain and Barcelona: a vibrant healthcare innovation environment

EIT Health is one of the largest **healthcare initiatives** worldwide. Our goal is to sustainably advance the fundamentals of healthcare and promote suitable future conditions for **healthy living, active ageing** and **improved wellbeing** of people across Europe. EIT Health leverages the expertise of more than 135 European member organizations.

In view of its unique flourishing environment, **Barcelona** was recognized as European **Capital of Innovation** - as it is home to near to 300 biotech companies, 30 research centres working in life sciences, 4 university hospitals, 7 universities offering degrees in life sciences and 7 science and technology parks. EIT Health Spain headquarters is located in the **Barcelona Science Park of the University of Barcelona**.

EIT Health Spain has 18 partners from three regions (Catalonia, Madrid and Valencia) involving strong agents in the three areas of EIT Health's activities: innovation projects, education and business creation. In addition, EIT Health Spain focuses on **six key strategic main innovation areas**: nutrition and frailty, big data and health analytics, chronic care management, neuroscience and neurological disorders, health



education and business support and development. As the Spanish co-location centre (CLC) of EIT Health, we are fully committed to offer to **European citizens solutions**, products and services for active ageing, healthy living and to improve healthcare systems.

To learn more about future challenges of healthcare visit: www.eithealth.eu



EIT Health Spain: Science Park of the University of Barcelona c/Baldiri Reixac, 4-8, Tower R - 08028 Barcelona T: +34 934 020 800



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Digital Age Research in Barcelona

The Open University of Catalonia (uoc.edu) conducts research **at the cutting edge between digital technologies and society**, tackling fields such as engineering, politics, economics, law, communication, education and **health** through different institutes and entities

IN3
Internet
Interdisciplinary
Institute

Internet Interdisciplinary Institute (IN3) Bringing human sciences and engineering together (in3.uoc.edu)

A pioneering centre that carries out cutting-edge applied research into the network society, the IN3 connects life sciences, social sciences, arts and humanities with ICT engineering in order to provide socio-technological solutions that meet the needs of our digital society.

IN3 research topics: Care and preparedness in the network society · Communication networks and social change · Complex systems · Digital Commons · Gender and ICT · Information and network security and privacy · Internet computing and systems optimisation · Software engineering · The Internet of Things · Urban transformations.



Open Evidence Evidence-based decision making (open-evidence.com)

International quantitative consultancy company that provides suitable strategies and operating models for decision making through data-driven computational intelligence. A spin-off from the UOC, Open Evidence helps administrations and companies to embrace change in the fields of evaluation and modelling, as well as in environmental, behavioural and health sciences.

UOC eHealth Center Connected health for a better life

New opening:

Patient-centered and evidence-based center aimed at identifying, developing, implementing and assessing models and technology-based solutions to improve the health and well-being of people, communities and how they relate to the health system.

UOC eHealth Center research topics: Patient empowerment and behavioural change · Participatory health and public engagement · Educational research on health · Health data science · mHealth · Privacy, data protection and the legal framework for eHealth.

Interested in joining us?

Contact us: ehhealthcenter@uoc.edu

Open predoctoral positions starting Dec. 1: Education & ICT | Information & Knowledge Society | Network & Information Technologies
More information: studies.uoc.edu/en/doctoral-programmes

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”la Caixa” Foundation will triple its investment in research

Up to 90 million euros per year by 2019

© ”la Caixa” Banking Foundation

With the aim of changing lives and building futures, ”la Caixa” Foundation has spent over 100 years striving to meet the challenges posed by society at any given time. Its work has focused on three broad strategic areas: social, scientific research, and culture and education. The Banking Foundation will invest 2,060 million euros in these areas over the next four years.

”la Caixa” Banking Foundation’s Strategic Plan for 2016-2019 further consolidates this commitment to people and to improving their quality of life, with research as one of its top priorities. To this end the Banking Foundation will triple the resources it allocates to research, going from the current investment of 30 million euros to 90 million by 2019.

The lines of investment in this area and the evaluation of the results will be carried out by a committee of 14 research experts of international renown such as the oncologist Dr. Josep Baselga and other outstanding figures such as the cardiologist Dr. Valentín Fuster and the ethicist Dr. Victoria Camps.

A top Foundation in the world as well in Research and Innovation

”la Caixa” Banking Foundation is among the global top foundations by assets and by yearly expenditure (500 M€). With a yearly budget of 90 million euros, from 2019 its research and innovation programme will also become one of the biggest R&I philanthropic programmes in Europe and the world.

The Research and Knowledge Area concentrates its efforts on giving support to excellent research centres, mainly in biomedical and health sciences, on promoting outstanding scientific careers and fostering innovation and technology transfer.

» **The Banking Foundation will invest 2,060 million euros in these areas over the next four years.** »

We support the following research lines and institutions, among others:

- Infectious diseases: **Institute for AIDS Research (IrsiCaixa) and Barcelona Institute for Global Health (ISGlobal).**
- Oncology: **Vall d’Hebron Institute of Oncology (VHIO) and Memorial Sloan Kettering Cancer Center.**
- Neuroscience: **Pasqual Maragall Foundation.**
- Cardiovascular: **National Cardiovascular Research Centre Carlos III (CNIC) and the Dr. Josep Trueta Girona Biomedical Research Institute.**
- Experimental science and mathematics: **Institute of Chemical Research of Catalonia (ICIQ) and the Mathematics Research Centre (CRM).**
- Social sciences and humanities: **Barcelona University, Autonomous University of Barcelona, Pompeu Fabra University, Autonomous University of Madrid and the University of Navarra.**

The Foundation also runs several different programmes that support careers in research such as the Doctoral Fellowship programme **InPhinit** (www.inphinitlacaixa.com) devoted to attracting **international Early-Stage Researchers** to the top Spanish research centres in the areas of Bio and Health Sciences, Physics, Technology, Engineering and Mathematics. It also fosters innovation through the **CaixaImpulse** open call (www.caixaimpulse.com) which helps to transfer projects in life and health sciences by offering 20 grants a year, as well as a whole programme of training and mentoring for technology transfer.

For more information visit: <https://lacaixafoundation.org>

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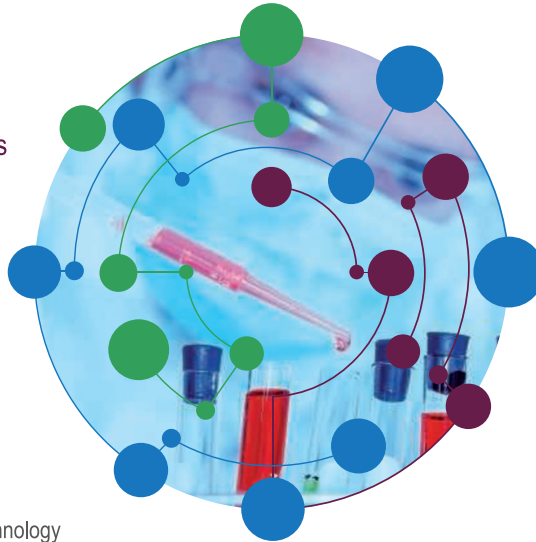
- Agro-Food science and technology
- Health and biomedicine
- Technology for sustainable societies
- Social and territorial development

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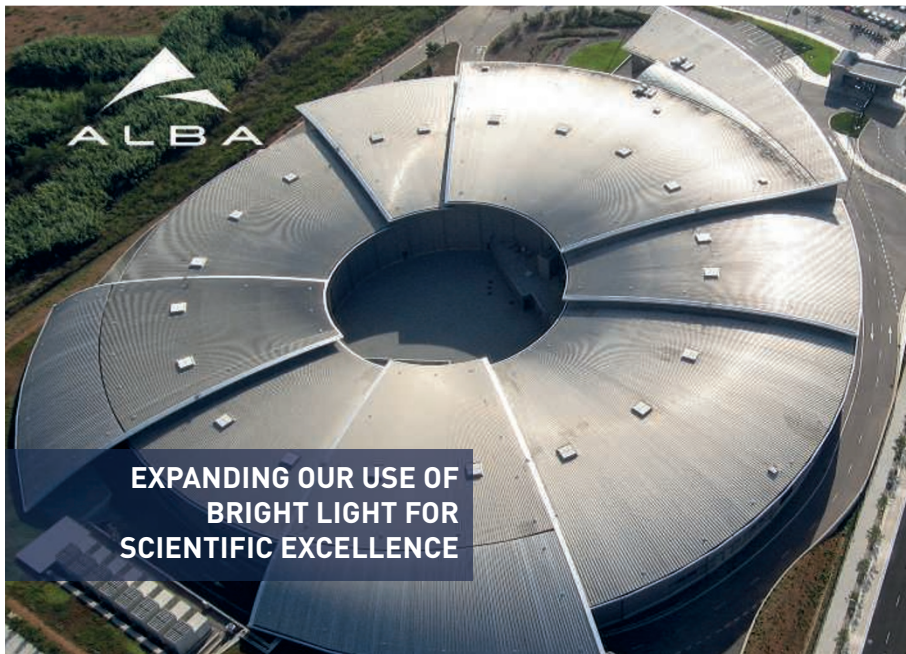
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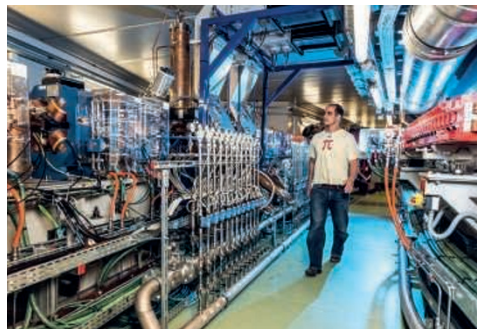
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evolution of ca. 3,000
persons with MS.
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from all these data, applied
technologies and the
talented work of
the multidisciplinary
team of Cemcat”**

www.cem-cat.org/talent

Multiple Sclerosis Centre of Catalonia (Cemcat)

Cemcat conducts research as one of its three main pillars aiming to contribute to improvements in diagnosis and treatment of multiple sclerosis (MS) and other neuroimmunological disorders.

We work in the international panels for MS diagnosis and clinical trials and we perform major projects within the EU research program as well as other large collaborative projects. We also have been involved in most clinical trials that have yielded every current agent for MS therapy. Accrued experience and critical mass soon allowed us to evolve into a reference centre with five opinion leaders that is present in many international research efforts as well as clinical and scientific forums.

Our work began twenty years ago in Vall d'Hebron Hospital when we started the first MS clinic and the first Neuroimmunology lab. Today Cemcat is an excellence centre for clinical care, research and education based on a holistic and integrated framework.

Patients trust and increase in numbers allowed for steady results through spearheading research performed by some 30 researchers. Our master database includes data from 7,000 patients and a large biological sample bank.

Even though our knowledge base has grown enormously, research challenges today continue to be many. The search for target biomarkers is a mainstay and one that Cemcat devotes the most resources to. Up-to-date, state-of-the-art technological resources and methodologies are put to this end by a talented team of nearly 70 professionals.

Our main aim is to continue to afford results and advancements that can speedily and solidly be brought from the bench to the bedside. Ever stronger collaboration and networking initiatives are paramount in attaining our objectives.

Our bottom line is our contribution to the understanding of the disease, improving on its diagnostic criteria and its treatment. We continue to add talent to our team to make this happen. Get in touch with us <talent@cem-cat.org>

MAIN RESEARCH LINES

- Therapeutic Research in MS
- Susceptibility, diagnostic and prognostic markers in MS
- Study of the response to disease-modifying drugs
- MRI measures of neurodegeneration in MS – Clinical implications
- Research for therapeutic targets and/or therapeutic approaches

Located inside the **Campus of Vall d'Hebron University Hospital in Barcelona, Spain**, the purpose built premises housing the Cemcat opened in 2012. It devotes more than **2.000 sq.m. to people with multiple sclerosis**



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ADVERTISEMENT FEATURE

Jordi Serra-Cobo, leader of eco-epidemiological team, Department of Evolutionary Biology, Ecology and Environmental Sciences, Faculty of Biology, University of Barcelona.

The interaction between human and animal health is not a new phenomenon, but the impact that zoonoses have today worldwide on human populations is an unprecedented phenomenon. Three quarters of emerging infectious diseases that affect people have its origin in animals. With more studies carried out and more information available, it is evident that the wildlife plays a key role in emerging zoonotic diseases. There are some good examples in SARS, Ebola, Chikungunya, MERS, rabies and Zika. The structure and functionality of ecosystems are changing at an unprecedented rate and can modify the interactions between humans and infected animals. Land modification, changes in vegetation pattern, changes in dynamics of reservoirs or vector species and microclimates changes can increase the contact between reservoirs and vectors species and humans, livestock or pets. Understanding infectious diseases beyond the scale of individual clinical cases requires an assessment of ecological and evolutionary perspectives.

To address the problem originated by the zoonosis a multidisciplinary approach is needed: the sanitary work done in the health centers, the viruses molecular studies, but also the eco-epidemiological works.

Jordi Serra-Cobo leads a team that over 25 years carries eco-epidemiological studies to understand the dynamic of species reservoirs and her zoonotic viruses. He works in Barcelona University in the Department of Evolutionary Biology, Ecology and Environmental Sciences of Biology Faculty. He is member of Research Institute of the Biodiversity. In 2008, he founded and directed the Research Centre of Viral Infectious Balearic Islands. Main works of the team are done in Catalonia, Balearic Islands and North of Africa and are about different reservoirs species. He also works with some hospitals from Mallorca and Tunisia. The team is doing long-term longitudinal studies in different bat colonies to understand the dynamic of potential reservoir species. In one of these colonies, located in Natural Park of Sant Llorenç del Munt i l'Obac, there are over 50 years of data.



Q: Why the eco-epidemiological studies are necessary?

Currently a lot of people work on the sanitary and molecular areas, but we need to complement these works with the eco-epidemiological research that allows knowing which are the reservoirs, the vector species and the key factors driving the spread of viruses. These factors must be taken into account in eco-epidemiological studies and are very important in order to find preventive measures that reduce the risk of transmission to the human population, livestock and pets. The emergence of a viral epidemic depends on the dynamics of the virus, which in turn will be influenced by reservoir dynamic and external environmental factors such as temperature, rainfall, degree of habitat conservation, the situation of stress affecting the reservoir species, ... The humans are part of an extremely complex biosphere, with multitude relationships between living organisms and the environment. For the understanding of the zoonotic diseases is also necessary the eco-epidemiological approach that consider these complex relationships and provides relevant information in terms of public health, because it allows assessing the epidemiological risk and take preventive measures.

Q: Which are the projects you are working on?

We are working on different international projects. The "Preparedness, Prediction and Prevention of Emerging Zoonotic Viruses with Pandemic Potential using Multidisciplinary Approaches (PREDEMICS)" is a European inter-disciplinary project that generates valuable data on patterns of crossing the species barrier, transmission and disease emergence, including ecological and anthropological factors, which determine virus availability and opportunities for exposure and infection. In this project, we analyse different vertebrate species. We have been working in Catalonia, Balearic Islands and North Africa and have obtained data about the dynamic of lyssaviruses, flavivirus and hepatitis E virus. Recently, we are starting European project about the Zika virus, "A global Alliance for Zika virus control and prevention (ZIKAlliance)", in which our task is to analyse the possible reservoir for the Zika virus in bats from Brazil and Bolivia by an eco-epidemiological approach.

Moreover, I'm included as expert in a French project of ANR "Eco-epidemiology of Coronaviruses, from wildlife to Human: Emergence threat assessment (EPICOREM)". It is a multidisciplinary project that has brought together researchers from a wide range of disciplines: human virology, animal virology, evolutionary biology, phylogenetic, zoology, ecology, epidemiology, and immunology.

I also take part in the network "Prevention of human rabies transmitted for wildlife animals from Americas REDIPRA (PAHO-WHO)". In this context, I collaborate with Zoonosis Control Center of Sao Paulo doing ecological analysis.

We are developing a "One Health" research in Barcelona Zoo Foundation and we work in the project "Zoonotic pathogens (bacteria, parasites and viruses) in Santa Cruz de Tenerife" (Canarias Islands, Spain).

Environmental health of natural spaces is related with the quality of its natural resources, but also with microorganisms that circulate on their biotic resources. In this context, we work in different protected areas of Catalonia. The National Park Aiguestortes and Estany de Sant Maurici is part of a network of eco-epidemiological stations distributed in a transect running from the Pyrenees to the Balearic Islands. This National Park, located in the Pyreneans, provides data about high mountain environment. We have organized this network to analyse the possible variations at large-scale of the viruses dynamics in populations reservoirs.

Q: More specifically, what is the team working out?

The team analyses the ecological and epidemiological factors that might be associated with the infection dynamics of zoonotic viruses. Many of our works are long longitudinal studies on reservoirs populations. In these works we obtain the population size, structure of the population, migratory and gregarious behaviour, degree of contact with wild or domestic species or human population, turnover rate of population, survival and mortality rates, habitat characteristics, relationship with other populations of the same or different species, incidence of possible environmental changes in the habitat, etc. Also, we analyse the inter-annual cycles of infection, the innate and lifespan immunity, the co-infection processes, and we estimate the basic reproductive rate of virus and threshold population for infection. The data provided by population ecology, epidemiology works and environmental factors is analysed altogether to obtain an eco-epidemiological interpretation.

Q: What can be the relationship between health and biodiversity?

The environmental changes and ecological disturbances, due to natural phenomena and human activities, can exert a strong influence on emerging diseases. These phenomena are important to consider because disease emergence frequently results from a change in hosts, or in vector, in pathogen ecology or in all of them. The loss or diminish of one or more species in a concrete area, can modify the dynamic of pathogen and change the sanitary risk. In summary, the equilibrium of wild populations and the biodiversity preservation can contribute to protect us from the emerging diseases. In the last years we have been working in this way, modelling how the disturbances can affect the reservoir populations and in turn can modify the epidemiological risk of viruses spread.

Q: What are your expectations?

Although today we already collaborate with a great number of research centers, to further expand this collaboration with other teams that are working in a complementary approach to our works would be key, in order to address the problem originated by zoonosis. Mainly hospitals or research centers that are doing molecular studies of the viruses as well as protected areas and zoos.

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VALL D'HEBRON
Institute of Oncology



Translation toward precision oncology

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Since occupying its new state-of-the-art facilities – the CELLEX Building, VHIO is now both consolidating its activities and strategically planning towards next-stage expansion. Marking this new chapter, VHIO has recently incorporated new talents to lead research into tumor immunology & immunotherapy, cellular plasticity and cancer, and chromatin dynamics. These groups, along with others to come, are set to complement, fortify and further strengthen VHIO's current programs, research lines and projects.

VHIO's infrastructure & research environment

Organized into four main programs: Preclinical, Translational, Clinical, and Core Technologies, VHIO's team of some 250 researchers and physician-scientists focus on understanding the fundamental biology of human cancer, from cellular and molecular biology and genetics through to therapeutics.

Its optimal organizational structure, coupled with its privileged location within the campus of the Vall d'Hebron University Hospital – affording direct access to patients as well as the entire spectrum of oncology professionals who care for them, allows VHIO to tackle the many unresolved questions in ultimately outsmarting the multifaceted, heterogeneous and complex disease that is cancer.

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For more about VHIO contact Amanda Wren, Email: awren@vhio.net, Tel. +34 932 543 450, or visit: www.vhio.net

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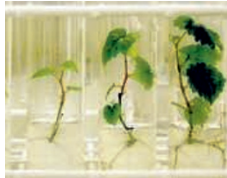
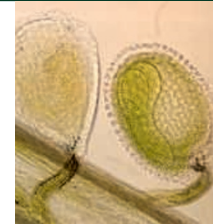
 The project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101019718.

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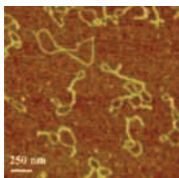
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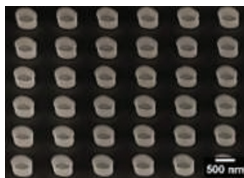
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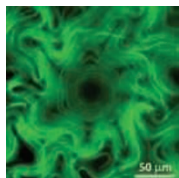
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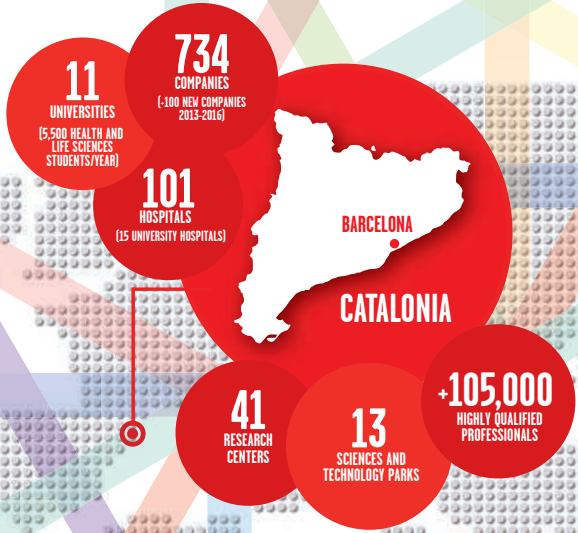
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CORRECTION

The *Naturejobs* Spotlight on Catalonia (*Nature* **539**, *Naturejobs*; 2016) described Josep Taberner as the director of the Vall d'Hebron University Hospital. He is, in fact, director of the Vall d'Hebron Institute of Oncology (VHIO) and head of the Medical Oncology Department at the Vall d'Hebron University Hospital. This has been corrected online and in this PDF.