

COMPETITIVE RESEARCH AT THE INTERNATIONAL LEVEL

Research plays a key role in the Catalan economy and it is competitive and of high quality: although we make up only 0.1% of the world's population, we produce 1.3% of the scientific articles, 39% of which appear in high impact scientific journals. Catalonia is one of the largest research centres in Europe and a world benchmark. For the Minister of Enterprise and Knowledge, Àngels Chacón, "the strategic vision of creating and promoting authentic national structures with research centres and infrastructures linked to knowledge, research and innovation in specific areas has made it possible for us to attract talent and projects and to boost the economy. The

generation of knowledge makes us more competitive. Now we have to improve the transfer of this research to the market". Chacón considers that the challenge for the coming years is to adapt the system of knowledge, innovation and research to the new context, which is evolving at an incredible speed: "We have to integrate the new technologies –blockchain, big data and the internet of things– into the research centres and into the activities of each of the projects. We have to ensure that our highly diversified productive activity integrates the new technologies and is linked to competitive knowledge at the international level".

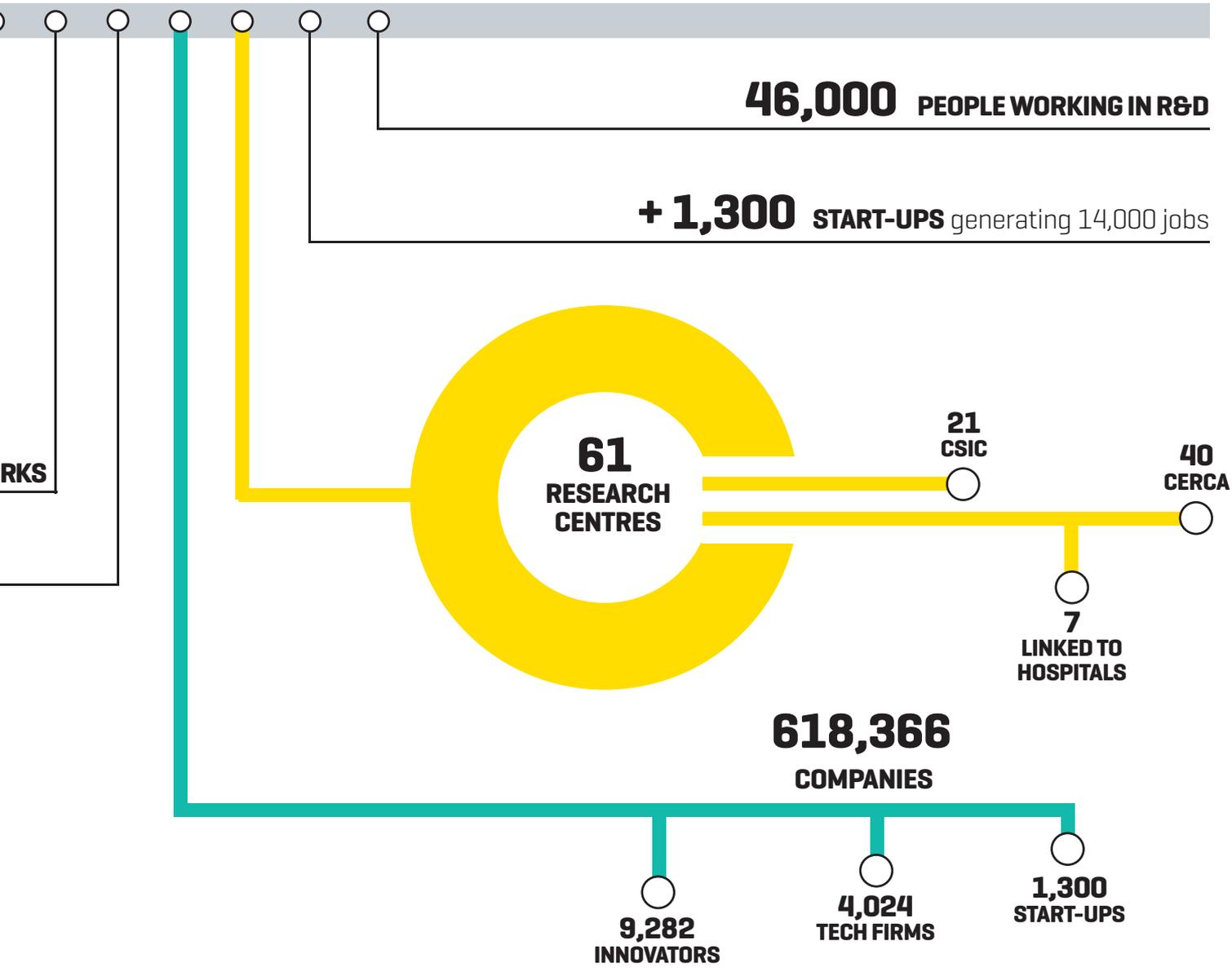
300 SPIN-OFFS with participation from the university and research system

26,402 RESEARCHERS

1,744 RESEARCH GROUPS

46,000 PEOPLE WORKING IN R&D

+ 1,300 START-UPS generating 14,000 jobs



PN@SC

In February 2019, the National Pact for the Knowledge Society (PN@SC) was officially presented. It's a nation-wide agreement, promoted by the Department of Enterprise and Knowledge, to promote a strategy shared among the fields of higher education, research and innovation and the productive economy to build the Catalonia

of the future. "The objective is to relate and finance ~3% of GDP in research and knowledge (1% public and 2% private)- and thereby energize the research that is being carried out, adapting to a new context. We have the potential and the elements needed to achieve that. We want a knowledge-based society that will drive a sustainable,

inclusive, innovative economy that is open to the world. The entire knowledge ecosystem is aware of the challenges and wants to be prepared to play a role in the international arena", explains the minister. In parallel, the PN@SC is promoting a law for science and a Catalan law for emerging companies, technology and disruption.



Manolo Garcia



OUTPATIENT SURGERY

Doctor Pablo Moreno, endocrinological surgeon, head of the Endocrinological Surgery Unit at Bellvitge University Hospital and director of the Institute of Endocrinological Surgery (ICE), has revolutionised thyroid surgery. Since 2017 he has performed more than 30 thyroid surgeries through the mouth. This simple and effective technique was perfected in Bangkok by Dr. Angkoon Anuwong, the world's foremost expert. And why in Thailand? In Southeast Asian countries, scars on the neck are a cultural taboo. The new technique consists of approaching the thyroid from behind the lip thereby creating endoscopic access for extraction. "Any new approach must maintain the quality related results of the previous technique - zero mortality, a minimal bleeding rate (until now non-existent), less than 1% of vocal cord nerve lesions and a rate of less than 3% in permanent parathyroid gland lesions - and offer improvements. This new minimally invasive surgical technique does not leave a visible scar on the neck, generates little discomfort and less pain and allows the patient to be discharged in less than 24 hours," argues the doctor. Dr. Moreno's professional career has always been synonymous with innovation: in 2000 he introduced minimal incisions in thyroidectomies, then ambulatory thyroid surgery, in 2016 he performed the first surgery through the armpit in Spain, before going on to develop transoral thyroid surgery, a technique in which he is the top authority in Europe. Faithful to his innovative character, he is already working to avoid one of the most frequent complications of thyroid surgery: permanent hypoparathyroidism. "We can preserve the functions of the parathyroid glands if we can see where they are; they're sometimes difficult to see with the naked eye. Thanks to fluorescence we can reliably predict which glands will work. In addition, there are devices able to capture the autofluorescence that some tissues -including the parathyroid glands- emit spontaneously. If at the same time, we inject fluorescence, which allows us to see which blood vessels nourish these glands, we avoid cutting the channel through which the blood reaches them". Doctor Moreno predicts that the future lies in screen-assisted surgery.

DRIVEN BY INNOVATION



Francesc Melcion



OMOMYC: THE ANTITUMOURAL DRUG

Omomyc is an intravenously administered antitumor drug without side effects that prevents tumour growth. The journal *Science Translational Medicine* (March 2019) has published a study that demonstrates its efficacy in preclinical models of non-small-cell lung cancer, the most aggressive and deadly subtype for women and men. The new drug is the fruit of the work carried out by the Mouse Models of Cancer Therapy Group at the Vall d' Hebron Institute of Oncology (VHIO), which is led by ICREA fellow Dr. Laura Soucek, with **Dr. Marie-Eve Beaulieu** as the principal investigator of the study. More than 20 years ago, Dr. Soucek began her research with the goal of inhibiting Myc, a key gene in the development of most tumors and an ideal target for cancer treatment. After designing the transgen Omomyc, which effectively inhibits the Myc protein without producing severe or irreversible adverse effects, they have gone on to make it an intravenously administered drug, which helps it to penetrate the cell nucleus and specifically inhibits Myc, attacking the cancer cells through different mechanisms without affecting other proteins. The mini-protein Omomyc is produced by Peptomyc SL, a spin-off from the VHIO, of which Dr. Soucek is a co-founder and the executive director and Dr. Marie-Eve Beaulieu is a co-founder and the scientific director. After demonstrating that Omomyc administered as an anti-tumour drug is tolerated and effective in mouse models of non-small-cell lung cancer, the next step is clinical trials in humans. The drug is already being produced and clinical trials in patients are set to begin in early 2020. Once the trials are over -they usually last about three years- a new cancer treatment protocol will come onto the market. "The results in animals are very promising, with no side effects, unlike all previous oncological approaches. Omomyc is the first tool we have at our disposal to target Myc, a protein shared by all types of cancer, which would allow us to find a universal rather than personalized therapy", explains Dr. Soucek.