

Scientific Report 2021-22

INSTITUTO DE BIOMEDICINA Y
BIOTECNOLOGÍA DE CANTABRIA



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O GREETINGS

Piero Crespo IBBTEC Director

Once again, I would like to welcome you somewhat differently from what I have done on previous occasions; this is, by congratulating us on how well Spanish science is faring. Unfortunately, yet once again, this is not the case. This, in spite of the fact that the past pandemic has evoked an unprecedented surge on society's awareness of

the necessity for supporting scientific research, as a means for finding solutions for almost anything. Not surprisingly, politicians have immediately grasped the prevailing mood, and "science" and "research" have become two common terms in their vocabulary, irrespective of their ideology. However, though much uttered, the true meaning of these words

appears to vanish rapidly and seldom makes its way to the BOE, to crystalize into real financial support and effective actions. In this respect, the scant increments on the budget of the Plan Estatal de Investigación –the main financial support for Spanish science– in the 2021 and 2022 annuities could hardly be described as significant. If otherwise, it could have represented a real boost for IBBTEC’s science, as its success rate in this program was 80% (8/10 projects) in 2021 and 100% (5/5 projects) in 2022.

On the other hand, it would be unfair on my part if I did not acknowledge the approval in 2022 of the “Ley de la Ciencia” by the Autonomous Government of Cantabria, as a turning point. This act establishes the legal framework to devote 2% of Cantabria’s regional budget for the support of scientific research in the Region. At least, it consecrates a real change in the sensitivity of the regional authorities towards science, and establishes, on paper, a step in the right direction. At most, it could really provide Cantabria’s science with the means for a definitive take-off. But we will have to “await for the morrow” to see how this law unfolds. As I mentioned at the Regional Parliament



during the sessions for its drafting, I am not aware of USA, Japan or Korea investing significant portions of their budgets in science, as a consequence of having similar laws. It is the politicians’ attitude, not the laws, what makes the difference. Such a law would be completely unnecessary if the attitude of our leaders towards science would be the adequate. And such a law will turn out to be nothing but useless if our politicians decide not to develop it further. So let us not fall into self-complacency. At least not yet.

Unfortunately, another major affliction of Spanish science, bureaucracy, has not improved at all during these past two years. Far from it, it has worsened. Nowadays, the paperwork and the administrative procedures required to undertake even the minimal everyday action necessary to run a laboratory, not to say an institute, have reached Kafkaian proportions. It is not unusual that researches are forced to devote over one third of their time to useless clerical activities in order to keep their science moving. And the, always scarce, administrative personnel simply cannot cope any more with the ever-growing form-filling, book-keeping, accounting, supervising.... they must accomplish on a daily basis to comply with ministe-

rial regulations. Quite literally, our administration is on the verge of collapse. We have reached a point in which, if our budget was to increase significantly we would face serious difficulties to spend it timely and efficiently.

The biennium 2021-2022 has been unquestionably characterized by the post-pandemic situation, still in effect worldwide. Though not as strict as during the pandemic, internal security regulations have continued in force, substantially perturbing IBBTECs daily activity. To this must be added severe alterations on the logistics of external supplies, still persistent. Plus the additional strain imposed on clerical work by the new, much questioned, “teletrabajo” fashion initiated during the pandemic, lagging and slowing even more the already highly inefficient administrative procedures. All of these have had an adverse impact on IBBTEC, precluding us from fully recovering the impulse of pre-pandemic years.

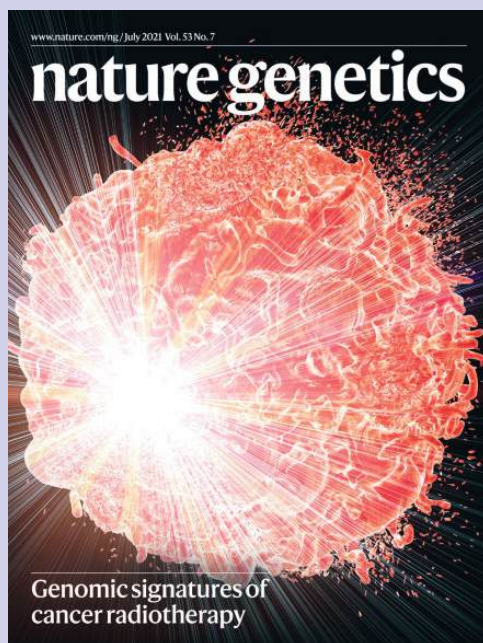
But benefits sometimes arise from adverse situations. This has become apparent in the case of our NCB3 biosafety laboratory. Originally designed to harbor research on hazardous microorganisms, it turned out to be one of the few in all Spain certified for the manipulation of SARS2 coronavirus.

This placed us in the spotlight of firms seeking for opportunities in the busy and diverse Covid-19 market. And hitherto agreements have been signed with five companies, eager to evaluate different aspects of their products related to SARS2 biology, in order to undertake such tests in our facility. This has bought a remarkable rise on IBBTECs visibility in the business realm, as well as constituting a much-welcomed source of external revenue.

But in spite of still navigating in troubled waters, these two years have yielded plenty of occasions for raising our spirits and boosting our morale to keep on going. Undoubtedly, a major feat has been the award in 2022 of a European Research Council (ERC) Consolidator grant to Dr. Fernando Calvo. This is quite an achievement, not only for Dr. Calvo but for IBBTEC as a whole, as having obtained three ERC grants in barely ten years of (effective) existence is an indisputable indicator of the quality of the science undergoing at IBBTEC and clearly positions us in the top rank among CSIC –and Spain in general–

biomedical institutes.

In 2021, we incorporated Dr. Juan Carlos Acosta, who obtained a CSIC Professor position after a successful period as group leader in Edinburgh University. As such, as of today IBBTEC harbors 21 research groups, organized in two Departments: Microbiolo-



gy and Genomics; and Molecular and Cellular Signaling. These groups are led by CSIC (9) and UC (12) staff scientists. Six other UC staff scientists are also included in different research groups.

Another reason for satisfaction has been observing that the flow of donations both from charities and private sources continues to grow. During 2021-2022, ASPLA S.A. has maintained his now constant contribution resulting from his “Empaquétalo en rosa” initiative, aimed at supporting breast cancer research, amounting to 25.000 €. Likewise, FIGEBA Foundation bestowed 3.000 € for the research on heart fibrosis. In the same line, BMC Assurance provided us with a tissue culture incubator worth 4.500 €. In addition, we received a 10.000 € bequest, whose donors wish to remain anonymous, to be devoted to the diffusion of the research on pathogenic microorganisms. We are deeply grateful to all these philanthropists whose altruistic contributions manifest society’s growing interest on scientific research and set up an example worth following.

With respect to our main objective: producing excellent science, and in spite of all the aforementioned shortcomings which made the environment far from optimal, the biennium 2021-2022 has witnessed a significant surge on the quality of IBBTEC’s



scientific productivity. In this period, IBBTEC’s researchers have generated 84 publications, both original research and reviews, in SCI-indexed journals. Of these, 59 (70%) are first quartile publications and 32 (38%) correspond to the first decile –top 10%– of their respective categories, in terms of impact factor. Twenty-three publications reached an impact factor > 10 (27%), with two publications having IF > 25. The cumulative impact factor for 2021-2022 was 794,

with an average impact factor of 9.5. This figure positions IBBTEC well above the mean IF of its parental institutions –CSIC and UC– and equals, and in some aspects even excels, that of internationally renowned leading centers, such as the Centro Nacional de Investigaciones Oncológicas (CNIO) and Centro Nacional de Biotecnología (CNB). A comparison that tilts even more to IBBTEC’s advantage if we consider that these are centers with a long tradition of success; much bigger both in size and personnel; and with much greater resources of all kinds. In addition to being in Madrid, a much more advantageous geographical location in every way.

Naturally, all of these publications emanate from the intense laboratory work performed at IBBTEC, on many occasions by students undergoing their post-graduate training in our groups. As such, during these two years 11 doctoral theses have been

presented by IBBTEC trainees, 8 of them with International Mention. Likewise, 27 students undertaking their degree final projects (Trabajo Fin de Grado) and 22 embarked on their master final projects (Trabajo Fin de Master) have also contributed with their experimental results to IBBTEC's productivity.

A ten years trajectory of publications in top journals, such as those of the *Nature*, *Science* and *Cell* families, has amplified the visibility, and the status, of IBBTEC's researchers quite considerably. Something that can be envisioned by the growing influx of foreign researchers, at different stages of their careers, that have elected IBBTEC as the place to pursue their goals. During 2021-2022, 22 researchers from: Argentina, Bolivia, Cuba, Ecuador, France, Germany, Greece, Italy, Ireland, Japan, Poland, Russia, Tunis and Venezuela, have carried out visits of different lengths, being attracted by the science in progress at IBBTEC's research groups. Regarding IBBTEC's international visibility, it is worth noticing that two of its staff scientists Prof. M. Llosa, as Internationalization Vicepresident, and Prof. G. Moncalian, as Area Director, are coordinators at UC of EUNICE (European UNiversity for Customized Education) of which UC is a member.

Of course, all of IBBTEC's scientific activity is but



the consequence of IBBTEC's researchers ability to attract external support. In this respect, 2021-2022 have also witnessed a remarkable increase both in the number and in the funding of the research projects obtained by our scientists. During this period, 80 projects have been ongoing, which could be classified according to the nature of their sources as obtained through: international competitive calls (7); national competitive calls (48); regional competitive calls (9); regional non-competitive funding (2); private competitive calls (7); and private non-competitive funding (4). All amount to 8.7 M€. Among them, it is worth highlighting two ERC Consolidator grants. To these must be added the obtention of two competitive infrastructure grants devoted to the acquisition of state-of-the-art equipment.

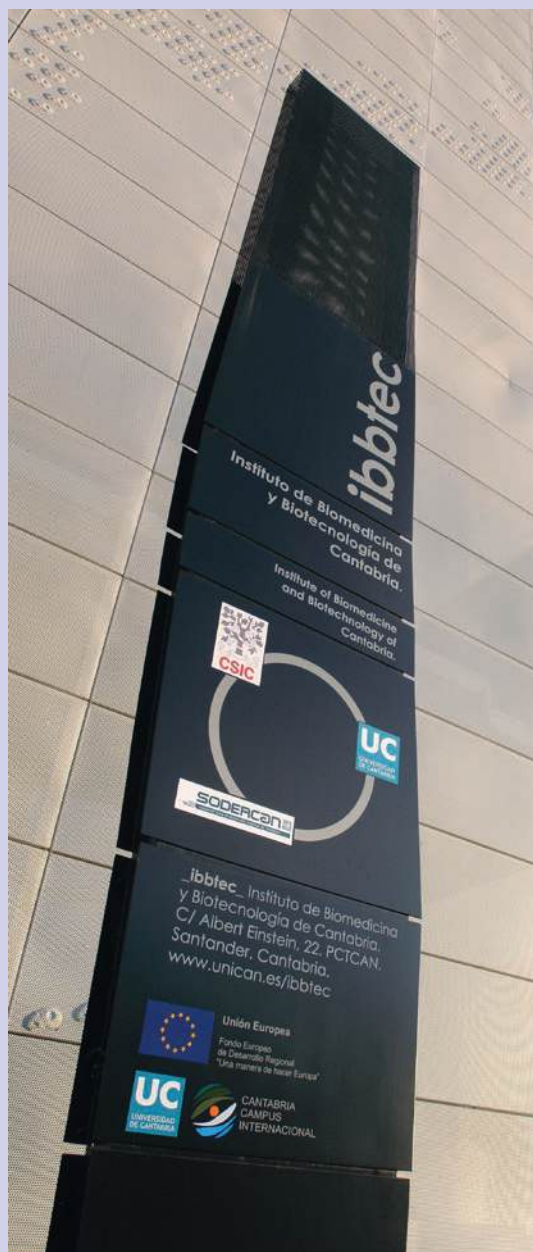
During this periods IBBTEC's groups have continued to be very active in national collaborative programmes and networks, together with the most relevant research groups in their respective fields. IBBTEC groups are included in: Centro de Investigación Biomédica en Red (CIBER) of: mental health (CIBERSAM) and oncology (CIBERONC). Likewise, we count with researchers as participants in the CSIC Hubs "Life", "Nano" and "Cancer", in the latter case as a member of the steering board. In addition, IBBTEC actively participates in the "Plan de Conservación Preventiva de la Cueva de Altamira", a multidisciplinary program aimed at the preservation of

Altamira Cave prehistoric paintings supported by University of Cantabria and the Secretaría de Estado de Cultura.

The second of IBBTEC's main goals is technology transfer. During 2021-2022, OpenLab, IBBTEC's unit devoted to technology transfer, innovation and entrepreneurship, has been actively working to boost our collaborations with the business world. Regarding the fruits emanating from our labs, amenable for economic exploitation, during this period we have filed two patents and six collaborative projects with external firms have been initiated to explore potential transfer scenarios. In this respect, IBBTEC launched its annual OPENLAB-INNOVA program aimed at the development of collaborative projects, fostering the interaction of companies with the Institute's research groups, allowing the access of external stakeholders to IBBTEC cutting-edge scientific and technical services. Several projects have been evaluated, and one of them, Inhibitec Anticuerpos S.L, has been enrolled. In addition, two other programs are well underway, these are the OPENLAB-CEO program which offers external professional consultancy for IBBTEC groups having results with economic exploitation potential; and the OPENLAB-CONSULTANCY providing consultancy, advisory, specialized infrastructure and project management services for external companies and entrepreneurs. Likewise, the OPENLAB-IBBTEC Scientific Transfer and Entrepreneurship Conferences are now firmly established, attracting an average 100-150 participants.

Added to research, innovation and transfer, during 2021-2022, IBBTEC has continued to play an active role on the dissemination of science, to boost public awareness of its essential role in modern society. To this end, we have participated in multiple public events and activities aimed at exposing our research activities to the public in general, with a special emphasis on the younger generations. As such, site visits from primary and secondary education schools are now quite common. And we are particularly glad of the feedback that we have received, both from teachers and students, on how our initiative sparks vocations among the youngsters. As it couldn't be otherwise, we have also actively collaborated in other outreach activities such as: Pint for Science; Semana de la Ciencia; la Noche Europea de los Investigadores; la Feria de la ciencia de la UC; Mujer y Ciencia; Sábados de la Ciencia; Aula de la Ciencia UC; II Congreso Internacional Micromundo; Campus de Verano UC; Olimpiada Matemática, etc. In addition, IBBTEC is intensively active in social networks, Twitter in particular, where we have over two thousand followers.

Overall, all of these unquestionable achievements, added to the faith and constant support provided to us by our parent institutions: CSIC, Universidad de Cantabria and the Regional Government of Cantabria through SODERCAN, is what make us face the future with endurance, dedication and optimism, in spite of the mountains of administrative forms that fall upon us every day.



Introduction

The Institute of Biomedicine and Biotechnology of Cantabria (IBBTEC) was born as a regional strategic project aimed at boosting biomedical/biotechnological research in Cantabria. It was officially created in 2007 as a joint center constituted by Spanish National Research Council (CSIC) and the University of Cantabria (UC), with the participation of Cantabria's Regional Government through SODERCAN (Sociedad para el Desarrollo Regional de Cantabria). Since 2013, it is located in its new 6.615 m² building, at the PCTCAN (Parque Científico y Tecnológico de Cantabria). The IBBTEC originated from several research groups at the University of Cantabria and two units associated with CSIC institutes, stemming from the Faculty of Medicine at the UC, with a strong background in biotechnology and biomedical research. IBBTEC was created with the idea of complementing and working in coordination with other biomedical research institutions in the Cantabria community: IDIVAL (Marqués de Valdecilla Research Institute), the Faculty of Medicine, and the Marqués de Valdecilla University Hospital. At this moment, 100-odd persons are working in it, focused on scientific research. In addition, IBBTEC is unique as it harbors in its premises space devoted to an “entrepreneurial Bio-incubator”, where the “OpenLAB” project is taking place. This is aimed at, after evaluation, supporting promising external initiatives in the biomedicine/biotechnology field, by providing them with academic know-how and technical support, plus marketing and financial guidance in order to facilitate their journey to become successful companies.

1 CENTER PRESENTATION



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ORGANIZATION

Organization and management

IBBTEC management and direction is implemented through the following control bodies:

- Steering Board (Comisión Rectora).
- Executive bodies: Institute Board; Director; Deputy Director and Chief Administrator
- Advisory bodies: Scientific Faculty and the External Scientific Advisory Board.

The Steering Board is made up of representatives appointed by each of the parental institutions, CSIC, UC and SODERCAN. It is the highest governing body and it rules over all issues regarding research, composition, organization, tasks and performance.

The Institute Board includes the Director, Deputy Director, Chief Administrator, Heads of the scientific departments and the OpenLab, and elected representatives of the Institute personnel. It meets regularly in order to discuss and decide over all scientific and organizational matters arising.

The Director is elected among the principal investigators every four years, following the Institute Board's advise. At the moment, the Director is Piero Crespo, CSIC Research Professor, and the Deputy Director is M^a Dolores Delgado, UC Professor.

The Scientific Faculty is an advisory body made up of every staff doctor. It meets at least

once a year. Its role is to advise the director with respect to whatever issue concerning the institute's scientific activities and organization.

The External Scientific Advisory Board is made up of prestigious, internationally renowned scientists: Mariano Barbacid (Centro Nacional de Investigaciones Oncológicas), Paola Bovolenta (Centro de Biología Molecular Severo Ochoa), Luis Ángel Fernández Herrero (Centro Nacional de Biotecnología), Rafael Giraldo (Centro Nacional de Biotecnología) and Ana Zubiaga (Universidad del País Vasco).

The Biosafety commission is an advisory body whose role is to evaluate and supervise every activity posing potential biohazards, such as research projects dealing with genetically-modified organisms and potentially dangerous biological agents. Its Head is Juan M^a García Lobo, UC Professor.

IBBTEC is a high-quality research institution, which is also committed to knowledge transfer as one of its main objectives. To this end, from its inception, the founding partners opted for the strategic development of technology transfer activities, creating a specific program, OpenLAB, and providing it with facilities specifically devoted to identifying, supporting, and hosting technology transfer and biotechnology-based startup projects.

14 Personnel



Personnel

During 2021-2022, IBBTEC hosted approximately 100 professionals involved the Institute's activities. The research staff includes permanent researchers as well as predoctoral and postdoctoral researchers, selected through competitive calls sponsored by UC, CSIC, national and international programs and private initiatives. The remaining professionals associated with the Institute include research support and administrative staff.

In 2022, the breakdown of the personnel was as follows: 27 permanent researchers, 1 Ramón y Cajal researcher, 1 Beatriz Galindo researcher, 1 María Zam-

brano researcher, 2 Margarita Salas researchers, 10 postdoctoral researchers, 35 predoctoral researchers (FPI, FPU, UC, AECC...), 6 technical staff members, 9 technicians sponsored by projects, and 8 management and administrative personnel.

Administrative Staff:

- M. Rosario Valle González, CSIC manager
- Carmen Palazuelos Corro, UC administrator
- Luis Coz Samperio
- Javier Menéndez Llamazares
- Eusebio Dohijo Gutiérrez
- Tomás Diego de Pablo

At IBBTEC, research groups are distributed in two departments: Department of Cellular and Molecular Signalling (Head: Marian Ros, CSIC Research Professor) and Department of Microbiology and Genomics (Head: Iñaki Arechaga, UC Associate Professor)

Department of Cellular and Molecular Signalling

- **Chronic Inflammatory and Autoimmune Diseases**
PI: Ramón Merino
- **Genomic analysis of tumour development**
PI: Ignacio Varela
- **Mechanisms and Regulation of Cell Division**
PI: Alberto Sánchez
- **Neurobiological Basis of the Mechanism of Action of Drugs acting at the Central Nervous System**
PIs: Ángel Pazos, Álvaro Díaz
- **Regulation of Gene Expression During Development**
PI: Marian Ros
- **Spatial Regulation of Ras-ERK Signals in Cancer**
PI: Piero Crespo
- **Systems Neurobiology**
PI: Albert Adell
- **Transcriptional control of cancer**
PIs: Javier León, M. Dolores Delgado
- **Transcriptional Regulation in Development and Congenital Disease**
PI: Álvaro Rada-Iglesias
- **Transformation and Metastasis**
PI: Berta Casar (E)*
- **Tumour Microenvironment**
PI: Fernando Calvo
- **Tumour suppression, cellular senescence, SASP and innovative therapies**
PI: Juan Carlos Acosta Cobacho

Department of Microbiology and Genomics

- **Bacterial Type IV Secretion Systems**
PI: Matxalen Llosa
- **Functional Plasmidomics**
PI: M. Pilar Garcillán
- **Intergenomics**
PI: Fernando de la Cruz
- **Molecular Biology of Brucella Pathogenicity**
PI: Juan M. García Lobo
- **Molecular Motors in Nanobiotechnology**
PIs: Elena Cabezón, Ignacio Arechaga
- **Nano and Molecular Treatments Against (Cardiac) Fibrosis**
PI: Ana V. Villar
- **Protein Design and Engineering**
PI: Gabriel Moncalián
- **Structural Biology of Macromolecular Complexes**
PI: María Lucas (E)
- **Systems Microbiology**
PI: Raúl Fernández López (E)

2 DEPARTMENTS & RESEARCH GROUPS

* (E): Emerging Groups





Cancer



Team Leader

Dr. Piero Crespo Baraja
(CSIC Research Professor)

Research Team

- Ana Herrero Mier, Juan de la Cierva Scientist
- Lorena Agudo Ibáñez, postdoctoral
- Dalia de la Fuente Vivas, predoctoral
- Rocío García Gómez, predoctoral
- Marta Morante Ezquerro, predoctoral
- Laura Ruiz Peinado, predoctoral
- Daniel Molina Carreño, predoctoral

Spatial Regulation of Ras-ERK Signals in Cancer

Contact

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Publications

- Rodrigo MAM, Michalkova H, Strmiska V, Casar B, Crespo P, de Los Rios V, Ignacio Casal J, Haddad Y, Guran R, Eckschlager T, Pokorna P, Heger Z, Adam V. Metallothionein-3 promotes cisplatin chemoresistance remodelling in neuroblastoma. *Sci Rep.* 2021 Mar 9;11(1):5496.
- Moreno T, Casar B, Crespo P, Morales Torres C, Scaffidi P, Gómez-Román J, Salido E, Varela I. ARID2 deficiency promotes tumor progression and is associated with higher sensitivity to chemotherapy in lung cancer. *Oncogene.* 2021 Apr;40(16):2923-2935.
- Walters KJ, Crespo P. Editorial overview: Macromolecular assemblies: clues from structural insights. *Curr Opin Struct Biol.* 2021 Apr;67:vi-viii.
- Herrero A, Crespo P. RAS Dimers: The Novice Couple at the RAS-ERK Pathway Ball. *Genes (Basel).* 2021 Sep 30;12(10):1556.
- Cho KJ, Liang JR, Crespo P, Aran V. Editorial: Ras and Other GTPases in Cancer: From Basic to Applied Research. *Front Mol Biosci.* 2021 Nov 29;8:804818.
- Lorenzo-Martín LF, Menacho-Márquez M, Fernández-Parejo N, Rodríguez-Fdez S, Pascual G, Abad A, Crespo P, Dosil M, Benitah SA, Bustelo XR. The Rho guanosine nucleotide exchange factors Vav2 and Vav3 modulate epidermal stem cell function. *Oncogene.* 2022 Jun;41(24):3341-3354.
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- Morante M, Pandiella A, Crespo P, Herrero A. Immune Checkpoint Inhibitors and RAS-ERK Pathway-Targeted Drugs as Combined Therapy for the Treatment of Melanoma. *Biomolecules.* 2022 Oct 26;12(11):1562.

Web site

<https://web.unican.es/ibbttec/i/PieroCrespoLab>

Research Lines

- Ras, ERK, MAP kinases, Scaffold proteins, Cancer. Ras, ERK, MAP kinases, Scaffold proteins, Cancer.

The work of the group focuses on studying the regulation of the Ras-ERK pathway. Specifically, how the cellular sublocalization and spatial compartmentalization of these signals impact their biochemical and biological effects, both in physiological and pathological contexts, particularly in cancer. Additionally, it explores how such spatial regulation can be exploited in the search for new anti-tumor therapies. In this regard, the group has identified ERK dimerization as a potential target for anti-tumor treatment and subsequently discovered a molecule that inhibits this dimerization, showing remarkable anti-neoplastic effects. These findings have been published in *Molecular Cell* and *Cancer Cell*, respectively. In this field, the group has published works in high-impact journals, including *Cancer Cell*, *Molecular Cell*, *Nature Cell Biology*, *EMBO J.*, and *J Cell Biol*.

Grants

- ERK spatial distribution and dimerization: implications in carcinogenesis (RTI2018-096658B). PI: Piero Crespo
- PTI SALUD GLOBAL-CSIC: Repurposing MAPK inhibitors for the treatment of COVID-19 (SG2103031_2107300020). PI: Piero Crespo y Berta Casar
- Proteínas HOX como mediadores de la ruta RAS-ERK (PID2021-126288OB-I00). PI: Piero Crespo
- Desarrollo de un marcador de la respuesta terapéutica del melanoma BRAF positivo (PDC2022-133569-I00). PI: Piero Crespo

Team Leaders

Dr. Javier León Serrano

(UC Full Professor)

Dra. M. Dolores Delgado Villar

(UC Full Professor)

Research Team

- Lorena García Gaipo, postdoctoral
- Lucía García Gutiérrez, postdoctoral
- Patricia Arribas, predoctoral
- Vanessa Junco Ruisánchez, predoctoral

Transcriptional Control in Cancer Cells and Stem Cells



Web site

<https://web.unican.es/ibbttec/i/JavierLeonLab>

<https://web.unican.es/ibbttec/i/MDoloresDelgadoLab>

Research Lines

- Transcriptional regulators, hematopoietic differentiation, MYC, MNT, CTCF, lymphomas

The group has been investigating the mechanisms of action of oncogenic transcription factors (MYC, MNT, MXD1, BCL6) and chromatin regulators (CTCF) in leukemias and lymphomas. They have made significant contributions to understanding the role of MYC and MNT in cellular differentiation and have identified new transcriptional interactions and targets. Their current research lines include: i) The role of the transcription factors MYC and MNT in lymphomas and myeloproliferative syndromes, ii) The role of the chromatin insulator factor CTCF in myeloid leukemia, iii) Interactions of MNT with regulatory proteins involved in the response to genomic damage. The group is funded by competitive national projects from the State Research Agency.

Grants

- Interacciones funcionales de MYC y CTCF en células de linfoma B agresivo y precursores hematopoyéticos (SAF2017-88026-R). Pls: Javier León and M. Dolores Delgado
- La red MYC-MNT: nuevas interacciones y su impacto en neoplasias hematológicas (PID2020-115903GB-I00). Pls: Javier León and M. Dolores Delgado
- Equipamiento para laboratorios de apoyo a la investigación del IBBTEC. Universidad de Cantabria. Pls: Javier León and M. Dolores Delgado

Publications

- Liaño-Pons J, Lafita-Navarro MC, García-Gaipo L, Colomer C, Rodríguez J, von Kriegsheim A, Hurlin PJ, Ourique F, Delgado MD, Bigas A, Espinosa L, León J. A novel role of MNT as a negative regulator of REL and the NF- κ B pathway. *Oncogenesis*. 2021 Jan 8;10(1):5.
- Liaño-Pons J, Arsenian-Henriksen M, León J. The Multiple Faces of MNT and Its Role as a MYC Modulator. *Cancers (Basel)*. 2021 Sep 18;13(18):4682.
- Aranda-Tavío H, Recio C, Martín-Acosta P, Guerra-Rodríguez M, Brito-Casillas Y, Blanco R, Junco V, León J, Montero JC, Gandullo-Sánchez L, McNaughton-Smith G, Zapata JM, Pandiella A, Amesty A, Estévez-Braun A, Fernández-Pérez L, Guerra B. JKST6, a novel multikinase modulator of the BCR-ABL1/STAT5 signaling pathway that potentiates direct BCR-ABL1 inhibition and overcomes imatinib resistance in chronic myelogenous leukemia. *Biomed Pharmacother*. 2021 Dec;144:112330.

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Dra. M. Dolores Delgado

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Team Leader

Dr. Alberto Sánchez Díaz
(UC Associate Professor)

Research Team

- Magdalena Foltman, UC Assistant Professor (PAD)
- Sergio Izquierdo Gea, predoctoral

Mechanisms and Regulation of Cell Division

Contact

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Publications

- Moyano-Rodríguez Y, Vaquero D, Vilalta-Castany O, Foltman M, Sanchez-Diaz A, Queralt E. PP2A-Cdc55 phosphatase regulates actomyosin ring contraction and septum formation during cytokinesis. *Cell Mol Life Sci.* 2022 Mar 1;79(3):165

Web site

<https://web.unican.es/ibbttec/i/AlbertoSanchezDiazLab>

Research Lines

- TORC1; Cbk1; cell division; Cytokinesis; cell separation, cell cycle

The signaling pathway known as the target of rapamycin (TOR) plays a crucial role in coordinating cell growth with the machinery that drives the cell cycle in eukaryotes. The molecular mechanism by which the TOR pathway controls cell cycle events after anaphase remains unknown. The purpose of our laboratory is precisely to understand these mechanisms. Defects in the final stages of the cell cycle can lead to genetically unstable cells that may contribute to cancer development. Studying the molecular details allows us to understand how a human cell is capable of coordinating growth and division, as well as the consequences if failures occur in this coordination

Grants

- Estudio de la función molecular del complejo TOR1 en la división celular eucariota (PID2019-106745GB-I00/ AEI / 10.13039/501100011033). PI: Alberto Sánchez Díaz

Team Leader

Dr. Ignacio Varela Egocheaga
(UC Associate Professor)

Research Team

- Beatriz Monterde García, predoctoral
- Laura Quevedo Palacios, predoctoral
- David Martín Gutiérrez, predoctoral
- Raquel Marqueño Navarro, predoctoral
- Rosa Blanco Fernández, technician



Genomic analysis of tumour development

Web site

<https://web.unican.es/ibbttec/i/IgnacioVarelaLab>

Research Lines

- Lung cancer, Genomics, Next-generation sequencing, SWI/SNF, Gene regulation

Tumors are complex entities composed of diverse cellular populations, including both normal and tumor cells with different genetic and transcriptional profiles. This complexity, partly due to increased cellular plasticity of tumor cells, plays a crucial role in the behavior of tumors in response to anti-tumor treatments. Our research group is interested in understanding the origin of this cellular plasticity, particularly as a result of the accumulation of alterations in epigenetic complexes such as SWI/SNF, to gain a better understanding of tumor progression mechanisms and use this information to improve cancer patient treatment.

Grants

- Conexiones entre las alteraciones en el complejo remodelador swi-snf y las rutas tumorales canónicas en cáncer de pulmón (PID2020-117539GB-I00). Ignacio Varela
- Multidisciplinary dissection of the chemotherapy resistance mechanisms in triple negative breast cancer: a step towards improved clinical care. AECC Coordinado 2021. Pls: Ángel Nebreda, Juan Miguel Cejalvo, Ignacio Varela, Fernando Calvo
- Plataforma de microscopía confocal con capacidad de superresolución y high content analysis (EQC2021-007165-P). PI: Ignacio Varela

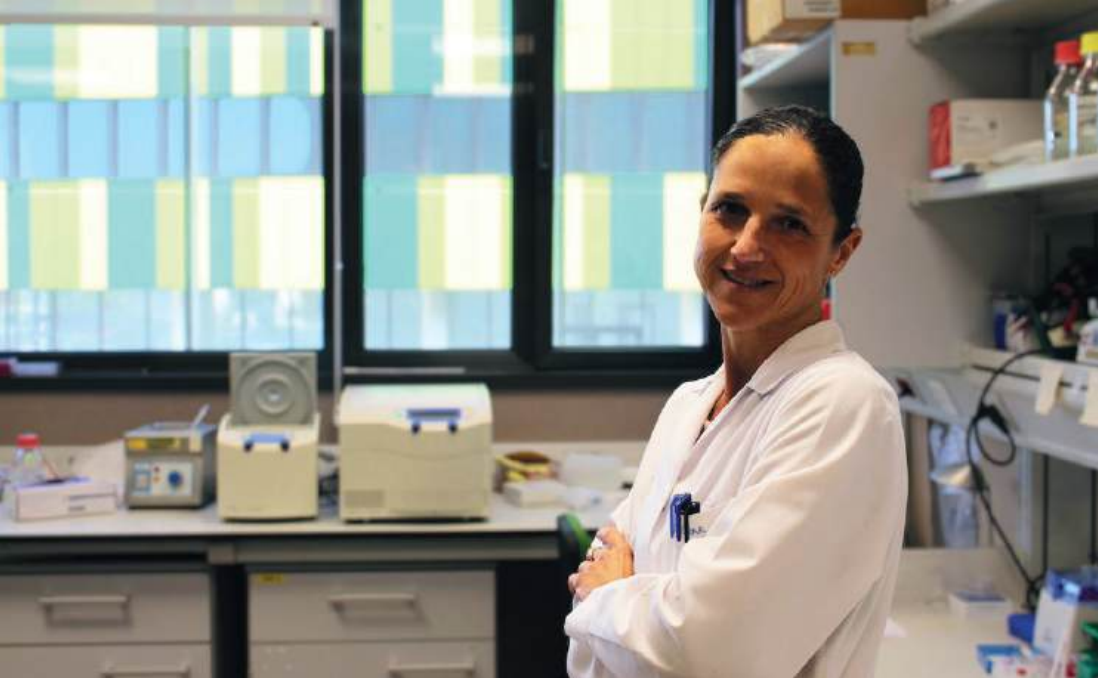
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Team Leader

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Research Team

- Violeta Márquez, technician

Transformation and Metastasis

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Publications

- Moreno T, Casar B, Crespo P, Morales Torres C, Scaffidi P, Gómez-Román J, Salido E, Varela I. ARID2 deficiency promotes tumor progression and is associated with higher sensitivity to chemotherapy in lung cancer. *Oncogene*. 2021 Apr;40(16):2923–2935.
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- Colón-Bolea P, García-Gómez R, Casar B. RAC1 Activation as a Potential Therapeutic Option in Metastatic Cutaneous Melanoma. *Bio-molecules*. 2021 Oct 20;11(11):1554.
- Karagianni F, Piperi C, Casar B, de la Fuente-Vivas D, García-Gómez R, Lampadaki K, Pappa V, Papadavid E. Combination of Resminostat with Ruxolitinib Exerts Antitumor Effects in the Chick Embryo Chorioallantoic Membrane Model for Cutaneous T Cell Lymphoma. *Cancers (Basel)*. 2022 Feb 20;14(4):1070.

Web site

<https://web.unican.es/ibbttec/i/BertaCasarLab>

Research Lines

- Signaling pathways involved in cancer and metastasis alterations.

The ultimate goal of these studies is to identify new therapeutic targets to halt metastasis and develop effective strategies for diagnosis and treatment. The group takes a multidisciplinary approach and utilizes chicken and mouse embryo models, organoids and 3D cultures, patient-derived xenografts, and clinical samples to translate basic oncology research into translational and clinically relevant outcomes.

Grants

- Contrato Ramón y Cajal. RYC-2018-024004-2020-2025
- Reposicionamiento de inhibidores de MAPK para tratamiento de COVID-19 (2020UIC22-PUB-0008). Co-PI: Berta Casar
- Repurposing MAPK inhibitors for the treatment of COVID-19 (202020E113). Proyecto intramural PTI salud Global CSIC. Co-PI: Berta Casar
- Mecanismos moleculares que determinan la resistencia a quimioterapia en neuroblastoma (PIE CSIC 201412 5 9). PI: Berta Casar
- Definir el mecanismo de activación de CDCP1 para bloquear metastasis de cancer de mama triple negativo (PID2020-112760RB-I00). PI: Berta Casar
- Development of a therapeutic response marker for metastatic melanoma (FERO XXI BFE-RO2103). PI: Berta Casar

Team Leader

Dr. Fernando Calvo
(CSIC Tenured Scientist)

Research Team

- Javier Rodríguez Martínez, postdoctoral
- María Subijana Fernández de Larrinoa, predoctoral
- Catalina Capó Serra, predoctoral
- Patricia Carnicero Jiménez, predoctoral
- Diane Coursier, predoctoral
- Silvia Domínguez García, predoctoral
- Beatriz Rodríguez Ortiz, predoctoral
- Francesca Nonatelli, predoctoral
- Miguel Juliá Molina, bioinformatician

Tumor Microenvironment



Web site

<https://web.unican.es/ibbttec/i/FernandoCalvoLab>

Research Lines

- Cancer, tumor microenvironment, CAFs, signaling, metastasis, resistance

Reprogramming of the stroma in cancer and its involvement in tumor processes, Characterization of the role of CAF heterogeneity in tumor progression. The tumor microenvironment, composed of non-cancerous cells and extracellular matrix molecules, can participate in many key processes in cancer. The Tumor Microenvironment group at IBBTEC investigates the multicellular context of solid tumors to understand the molecular mechanisms that regulate cancer progression, dissemination, and response to therapies. The ultimate goal of these studies is to improve the fundamental knowledge of cancer biology to guide future strategies for better diagnosis and treatment of the disease. To achieve this, we work with academic, clinical, and engineering collaborators in projects with a strong multidisciplinary background, integrating experimental cancer models, clinical material, preclinical models, as well as complex in vitro systems and bioinformatic analysis of high-content information.

Grants

- Harnessing Stromal Fibroblasts to Reduce Resistance and Improve Colon Cancer Therapeutics. 101045756 ERC Consolidator Grant. PI: Fernando Calvo.
- Silencing the pro-tumor crosstalk between cancer-associated fibroblasts and the tumor microenvironment in colorectal cancer. PID2021-128107OB-I00. PI: Fernando Calvo.
- Microscopy platform with super-resolution and high content analysis (HCA) capabilities. EQC2021-007003-P. PIs: Ignacio Varela (PI), Piero Crespo, Maria Angeles Ros, Fernando Calvo, Juan Carlos Acosta.
- Multidisciplinary dissection of the chemotherapy resistance mechanisms in triple negative breast cancer: A step towards improved clinical care. PRYCO211372RODR. PIs: Angel Nebreda, Fernando Calvo et al.
- Targeting cancer-associated fibroblasts using HDAC inhibitors to improve therapies for breast, ovarian and colon cancers. LABAE19044CALV. PI: Fernando Calvo.
- Cortocircuitar el microambiente tumoral para entorpecer el desarrollo de cánceres agresivos. IN[19]_BBM_BAS_0076. PI: Fernando Calvo.
- Identification and characterization of strategies to modulate cancer-associated fibroblasts to deter tumour progression (STOPCAF). RTI2018-096778-A-I00. PI: Fernando Calvo.
- Ramon y Cajal Research Program. RYC-2016-20352.

Publications

- Araujo AM, Abaurrea A, Azcoaga P, López-Velazco JI, Manzano S, Rodríguez J, Rezola R, Egia-Mendikute L, Valdés-Mora F, Flores JM, Jenkins L, Pulido L, Osorio-Querejeta I, Fernández-Notegueira P, Ferrari N, Viera C, Martín-Martín N, Tzankov A, Eppenberger-Castori S, Alvarez-Lopez I, Urruticoechea A, Bragado P, Coleman N, Palazón A, Carracedo A, Gallego-Ortega D, Calvo F, Isacke CM, Caffarel MM, Lawrie CH. Stromal oncostatin M cytokine promotes breast cancer progression by reprogramming the tumor microenvironment. *J Clin Invest.* 2022 Apr 1;132(7):e148667.
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Tumor Suppression, Cellular Senescence, SASP, and Innovative Therapies

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Publications

- Millar FR, Pennycuik A, Muir M, Quintanilla A, Hari P, Freyer E, Gautier P, Meynert A, Grimes G, Coll CS, Zdral S, Victorelli S, Teixeira VH, Connelly J, Passos JF, Ros MA, Wallace WAH, Frame MC, Sims AH, Boulter L, Janes SM, Wilkinson S, Acosta JC. Toll-like receptor 2 orchestrates a tumor suppressor response in non-small cell lung cancer. *Cell Rep.* 2022 Nov 8;41(6):111596.
- Fernández-Durán I, Quintanilla A, Tarrats N, Birch J, Hari P, Millar FR, Lagnado AB, Smer-Barreto V, Muir M, Brunton VG, Passos JF, Acosta JC. Cytoplasmic innate immune sensing by the caspase-4 non-canonical inflammasome promotes cellular senescence. *Cell Death Differ.* 2022 Jun;29(6):1267–1282.
- Ferreira-Gonzalez S, Acosta JC et al. Senolytic treatment preserves biliary regenerative capacity lost through cellular senescence during cold storage. *Sci Transl Med.* 2022 Dec 7;14(674):eabj4375.
- Altea-Manzano P, Vandekeere A, Edwards-Hicks J, Roldan M, Abraham E, Lleshi X, Guerrieri AN, Berardi D, Wills J, Junior JM, Pantazi A, Acosta JC, Sanchez-Martin RM, Fendt SM, Martin-Hernandez M, Finch AJ. Reversal of mitochondrial malate dehydrogenase 2 enables anaplerosis via redox rescue in respiration-deficient cells. *Mol Cell.* 2022 Dec 1;82(23):4537–4547.e7.
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- Younger NT, Wilson ML, Martinez Lyons A, Jarman EJ, Meynert AM, Grimes GR, Gournopoulos K, Waddell SH, Tennant PA, Wilson DH, Guest RV, Wigmore SJ, Acosta JC, Kendall TJ, Taylor MS, Sproul D, Mill P, Boulter L. In Vivo Modeling of Patient Genetic Heterogeneity Identifies New Ways to Target Cholangiocarcinoma. *Cancer Res.* 2022 Apr 15;82(8):1548–1559.

Web site

<https://web.unican.es/ibbttec/i/JuanCarlosAcostaLAB>

Research Lines

- Cancer, tumor suppression, cellular senescence, SASP, innate immune system signaling, inflammasome, toll-like receptors, pyroptosis

The group focuses on discovering new tumor suppression pathways through the study of cellular senescence, a critical biological process in the anti-tumor physiological response and a key marker of cancer. The group is a pioneer in the discovery of SASP, a proinflammatory phenotype that determines the role of senescent cells in cancer as well as their negative effects on age-related diseases. They also study the signaling pathways of innate immune system receptors in controlling SASP. The group's objective is to unravel the regulation mechanism of oncogene-induced senescence and the activation of SASP by these immune system signaling pathways. This research aims to identify new therapeutic targets for manipulating the senescent phenotype in both cancer and aging.

Grants

- Microscopy platform with super-resolution and high content analysis (HCA) capabilities (EQC2021-007003-P). Pls: Ignacio Varela, Juan Carlos Acosta et al.
- Caracterización del papel del receptor del sistema inmune innato asociado a senescencia TLR2 en cáncer de pulmón (SA-TLR-LUNC - PID2020-117860GB-I00). PI: Juan Carlos Acosta
- Identification and Characterisation of the TLR2-CASP4 Mediated Non-Canonical Inflammasome in Non-Small Cell Lung Cancer (6146161/ ECAT-Plus 2018). PI: Juan Carlos Acosta
- Characterization of the Senescence Associated Extracellular Matrix (SA-ECM) and its role in cancer progression (1179001). PI: Juan Carlos Acosta

Developmental biology



Team Leader

Dra. Marian Ros Lasiera
(CSIC Research Professor)

Research Team

- Alejandro Castilla Ibeas, predoctoral
- Sara Lucas Toca, predoctoral
- Sandra Moreu Sobera, predoctoral
- Sofía Zdráhal Noguero, predoctoral
- Laura Galán Liaño, technician

Regulation of Gene Expression During Development

Contact

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Publications

- Millar FR, Pennycuik A, Muir M, Quintanilla A, Hari P, Freyer E, Gautier P, Meynert A, Grimes G, Coll CS, Zdráhal S, Victorelli S, Teixeira VH, Connelly J, Passos JF, Ros MA, Wallace WAH, Frame MC, Sims AH, Boulter L, Janes SM, Wilkinson S, Acosta JC. Toll-like receptor 2 orchestrates a tumor suppressor response in non-small cell lung cancer. *Cell Rep.* 2022 Nov 8;41(6):111596.
- Lancman JJ, Hasso SM, Suzuki T, Kherdjemil Y, Kmita M, Ferris A, Dong PDS, Ros MA, Fallon JF. Downregulation of Grem1 expression in the distal limb mesoderm is a necessary precondition for phalanx development. *Dev Dyn.* 2022 Sep;251(9):1439–1455.
- Haro E, Petit F, Pira CU, Spady CD, Lucas-Toca S, Yorozuya LI, Gray AL, Escande F, Jourdain AS, Nguyen A, Fellmann F, Good JM, Francannet C, Manouvrier-Hanu S, Ros MA, Oberg KC. Identification of limb-specific Lmx1b auto-regulatory modules with Nail-patella syndrome pathogenicity. *Nat Commun.* 2021 Sep 20;12(1):5533.
- Fernández-Guerrero M, Zdráhal S, Castilla-Ibeas A, Lopez-Delisle L, Duboule D, Ros MA. Time-sequenced transcriptomes of developing distal mouse limb buds: A comparative tissue layer analysis. *Dev Dyn.* 2022 Sep;251(9):1550–1575.

Web site

<https://web.unican.es/ibbttec/i/MarianRosLab>

Research Lines

- Development of limbs, Pattern formation, Morphogenesis, Regeneration

Within our group, our efforts are focused on understanding how an organ or tissue is formed or repaired, which is relevant not only for understanding embryonic development but also for regenerative medicine based on cellular therapy and tissue engineering. Our goal is to elucidate the complex gene network that regulates the formation of a complex three-dimensional organ from a group of stem cells and how its alteration can result in disease or malformation. Our preferred model is the developing limb in both chickens and mice. We combine classical techniques of embryonic manipulation with mouse genetics, generation of disease models through CRISPR-Cas, and genomic analysis.

Grants

- Dorso-ventral polaridad de la extremidad y su implicación en morfogenésis y regeneración (PID2020-114525GB-I00). PI: Marian Ros

Team Leader

Dr. Álvaro Rada Iglesias
(CSIC Tenured Scientist)

Research Team

- Patricia Respuela Alonso, postdoctoral
- Endika Haro Gabikagogeascoa, postdoctoral
- Helena Gómez Asenjo, postdoctoral
- Lara Zorro Sahidian, postdoctoral
- Tomás Pachano, postdoctoral
- María Mariner Fauli, predoctoral
- Víctor Sánchez Gaya, predoctoral
- Sarah Robert, predoctoral
- Thais Ealo Rodríguez, predoctoral
- Marianna Iliadou, predoctoral
- María Muñoz San Martín, predoctoral



Transcriptional Regulation in Development and Congenital Disease

Web site

<https://web.unican.es/ibbttec/i/AlvaroRadaLab>

Research Lines

- Enhancers, Development, Transcriptional Regulation, Chromatin, Congenital Diseases

The main interest of our laboratory is to uncover the key genetic and epigenetic factors that control the execution of gene expression programs during embryonic development. Our goal is to provide a mechanistic understanding of the non-coding genomic space that is dynamically and specifically utilized during mammalian embryogenesis, which is crucial for deciphering the molecular basis of human congenital diseases.

Grants

- Disecion genética de la precisión transcripcional controlada por potenciadores (PID2021-123030NB-I00). PI: Alvaro Rada
- Diseción de la lógica reguladora de los potenciadores capacitados presentes en células pluripotentes (PGC2018-095301-B-I00). MCIU. PI: Alvaro Rada
- Chrom_Rare. European Training Network (ETN). PI: Alvaro Rada
- Poisedlogic-dissecting the regulatory logic of poised enhancers. European Research Council ERC Consolidator grant. PI: Alvaro Rada
- Enhpathy-molecular basis of human enhanceropathies. Marie Skłodowska-Curie action (MSCA)-ITN-ETN;European Training Network (ETN): PI: Alvaro Rada
- Transcriptional Regulation during vertebrate Embryonic Patterning: from genomics to mechanism. (STAR2 Programme). PI: Alvaro Rada

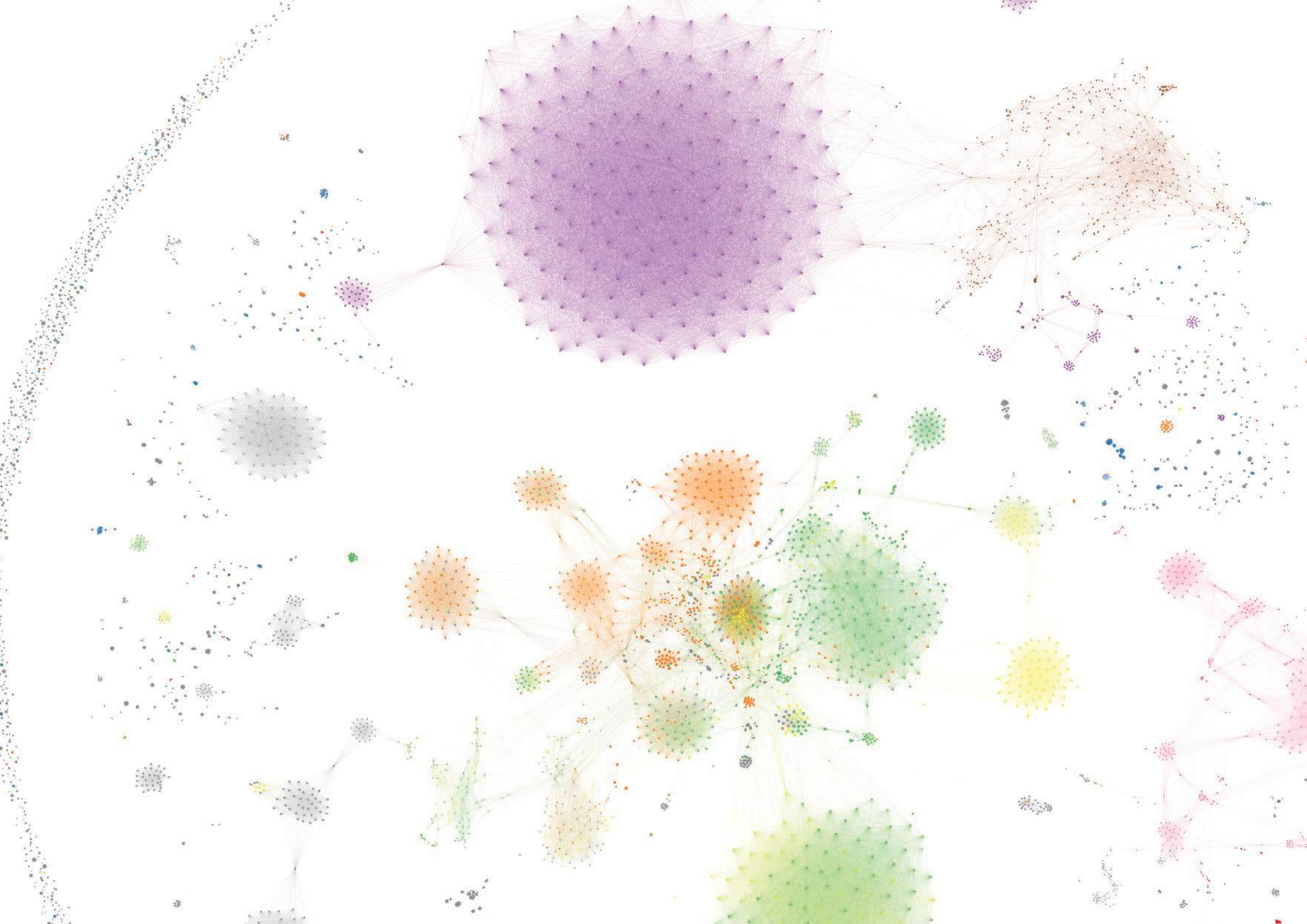
Publications

- Zaugg JB, Rada-Iglesias A et al. Current challenges in understanding the role of enhancers in disease. *Nat Struct Mol Biol.* 2022 Dec;29(12):1148-1158.
- Ishorst N, Rada-Iglesias A et al. Identification of de novo variants in nonsyndromic cleft lip with/without cleft palate patients with low polygenic risk scores. *Mol Genet Genomic Med.* 2022 Dec 5:e2109. doi: 10.1002/mgg3.2109. PMID: 36468602
- Srinivasan SP, Rada-Iglesias A et al. Epigenetic mechanisms of Strip2 in differentiation of pluripotent stem cells. *Cell Death Discov.* 2022 Nov 5;8(1):447.
- Pachano T, (...) Rada-Iglesias A. Orphan CpG islands amplify poised enhancer regulatory activity and determine target gene responsiveness. *Nat Genet.* 2021 Jul;53(7):1036-1049.
- Pachano T, Rada-Iglesias A. Protocol to study sufficiency of cis-regulatory elements in mouse embryonic stem cells using a CRISPR-mediated knockin approach. *STAR Protoc.* 2022 Jun 21;3(3):101492.
- Pachano T, Haro E, Rada-Iglesias A. Enhancer-gene specificity in development and disease. *Development.* 2022 Jun 1;149(11):dev186536.
- Vicioso-Mantis M, Rada-Iglesias A et al. JMJD3 intrinsically disordered region links the 3D-genome structure to TGF β -dependent transcription activation. *Nat Commun.* 2022 Jun 7;13(1):3263
- Welzenbach J, Rada-Iglesias A et al. Integrative approaches generate insights into the architecture of non-syndromic cleft lip with or without cleft palate. *HGG Adv.* 2021 Jun 8;2(3):100038.
- Bleckwehl T, (...) Rada-Iglesias Á. Enhancer-associated H3K4 methylation safeguards in vitro germline competence. *Nat Commun.* 2021 Oct 1;12(1):5771.
- Stüssel LG, Rada-Iglesias A et al. MiR-NA-149 as a Candidate for Facial Clefting and Neural Crest Cell Migration. *J Dent Res.* 2022 Mar;101(3):323-330.11.
- Crispatsu G, (...) Rada-Iglesias A. The chromatin, topological and regulatory properties of pluripotency-associated poised enhancers are conserved in vivo. *Nat Commun.* 2021 Jul 16;12(1):4344.
- Koester J, Rada-Iglesias A et al. Niche stiffening compromises hair follicle stem cell potential during ageing by reducing bivalent promoter accessibility. *Nat Cell Biol.* 2021 Jul;23(7):771-781.
- Kargapolova Y, Rada-Iglesias A et al. Overarching control of autophagy and DNA damage response by CHD6 revealed by modeling a rare human pathology. *Nat Commun.* 2021 May 21;12(1):3014.
- Thues C, Rada-Iglesias A et al. MAPRE2 mutations result in altered human cranial neural crest migration, underlying craniofacial malformations in CSC-KT syndrome. *Sci Rep.* 2021 Mar 2;11(1):4976.
- Araujo SJ, Rada-Iglesias A et al. Virtual meeting, real and sound science: report of the 17th Meeting of the Spanish Society for Developmental Biology (SEBD-2020). *Int J Dev Biol.* 2021;65(7-8-9):457-464.

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Structural Biology



Team Leader

Dra. María Jesús Lucas Gay
(Ramón y Cajal Researcher)

Research Team

- Aurora Martín González, predoctoral
- Eva Martínez Lombardía, predoctoral
- Iván Méndez Guzmán, predoctoral

Structural Biology of Macromolecular Complexes

Contact

Dra. María Lucas

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Publications

- Foltman M, Méndez I, Bech J, de la Torre C, Brace JL, Weiss EL, Lucas M, Queralt E, Sánchez-Díaz A. (2023) Functional interplay between TOR Complex 1 (TORC1) and mitotic kinase Cdc15 regulates the conserved NDR kinase Cbk1 to control cell separation in budding yeast. *Plos Biology* (under review).

Web site

<https://web.unican.es/ibbttec/i/MariaLucasLab>

Research Lines

- Structural Biology, X-ray Crystallography, Intracellular Trafficking, Endosomal Recycling, Neurodegenerative Diseases, Human Papillomavirus

The recycling of membrane proteins is a process that occurs in endosomes and plays an essential role in maintaining cellular homeostasis. Our group investigates the mechanisms of action of protein complexes involved in the sorting of membrane proteins in endosomes and the formation of recycling vesicular transporters. Through our research, we aim to elucidate the association of defects in this recycling process with various neurodegenerative disorders and how certain viruses hijack this transport pathway for their intracellular replication. To achieve this, we combine studies of structural resolution, using both X-ray crystallography and cryo-electron microscopy, with biophysical, genetic, and cellular studies.

Grants

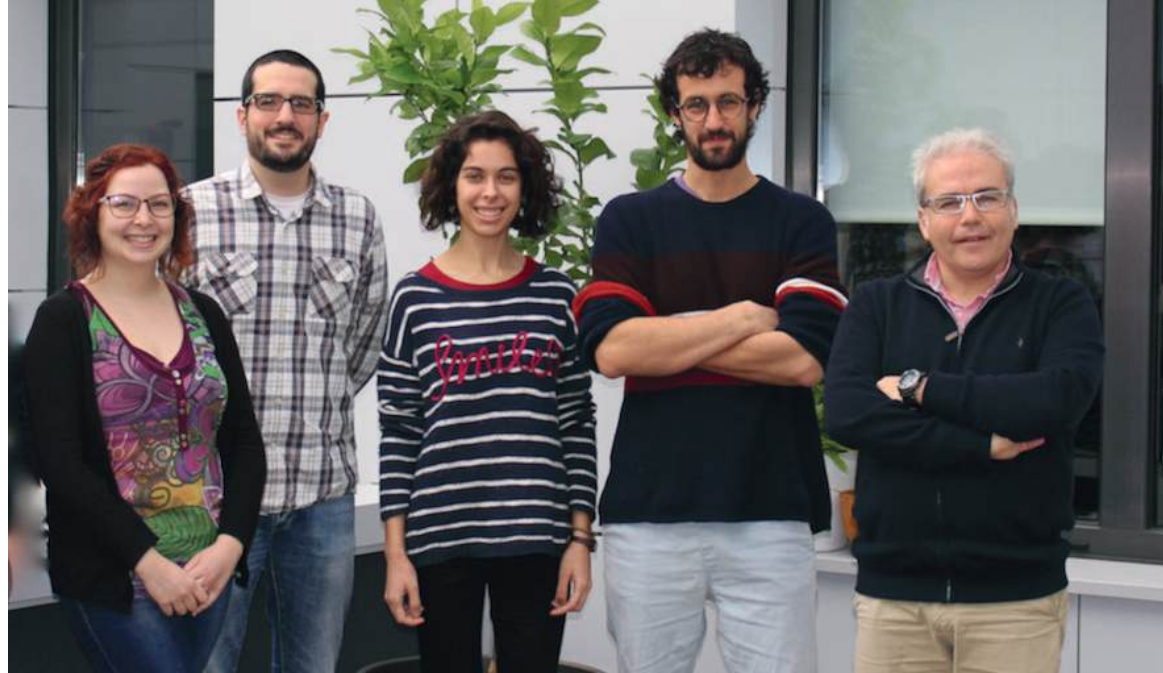
- Modification of megasynthases for the production of sustainable chemical precursors (TED2021-129278B-I00). PI: María Jesús Lucas Gay and Gabriel Moncalián
- Mechanism of Retriever action during HPV infection (PID2021-122611NB-I00). PI: María Jesús Lucas Gay
- Un nuevo mecanismo de selección y reciclado de proteínas integrales de membrana en endosomas (RTI2018-097801-B-I00). PI: María Jesús Lucas Gay
- Structural biology of macromolecular complexes (RYC-2016-20342). PI: María Jesús Lucas Gay

Team Leader

Dr. Gabriel Moncalián Montes
(UC Associate Professor)

Research Team

- Nahuel Ismael Lofeudo Álvarez, predoctoral
- Sergio San Miguel Escudero, predoctoral



Protein Design and Engineering

Web site

<https://web.unican.es/ibbttec/i/GabrielMoncalianLab>

Research Lines

- Protein Crystallography, DNA-binding Proteins, Bacterial Conjugation, Polyunsaturated Fatty Acid Synthesis, Chemical Precursors

Protein engineering allows for the optimization of natural polypeptides for various biomedical and biotechnological applications. Thus, our group utilizes this approach to optimize enzymes involved in the synthesis of commercially relevant fatty acids or for the design and optimization of DNA-binding proteins. These efforts are complemented with X-ray crystallography studies to elucidate the structure of the proteins being optimized. In these areas, we have published a patent and approximately fifty articles, primarily in high-impact international journals.

Grants

- Plataforma de cromatografía acoplada a espectrometría de masas (EQC2021-007113-P)
- Megasintetas de ácidos grasos poliinsaturados: estructura, optimización y aplicaciones (PID2021-122164NB-I00). PI: Gabriel Moncalián
- Modificación de megasintetas para la producción de precursores químicos sostenibles (TED2021-129278B-I00). PI: Gabriel Moncalián

Publications

- Fernandez-Lopez, R.; Ruiz, R.; del Campo, I.; Gonzalez-Montes, L.; Boer, D.R.; de la Cruz, F. and Moncalian, G. (2022). Structural basis of direct and inverted DNA sequence repeat recognition by helix-turn-helix transcription factors. *Nucl. Acids Res.* 50,11938-11947.
- Qùebre V, Del Campo I, Cuevas A, Siguier P, Rech J, Le PTN, Ton-Hoang B, Cornet F, Bouet JY, Moncalian G, de la Cruz F, Guynet C. Characterization of the DNA Binding Domain of StbA, A Key Protein of A New Type of DNA Segregation System. *J Mol Biol.* 2022 Oct 15;434(19):167752
- Wan X, Zhou XR, Moncalian G, Su L, Chen WC, Zhu HZ, Chen D, Gong YM, Huang FH, Deng QC. Reprogramming microorganisms for the biosynthesis of astaxanthin via metabolic engineering. *Prog Lipid Res.* 2021 Jan;81:101083.
- Basauri, A, Fallanza, M, Giner-Robles, L, Fernandez-Lopez, R, Moncalián, G, de la Cruz, F, Ortiz, I. Integrated strategy for the separation of endotoxins from biofluids. LPS capture on newly synthesized protein. *Sep Purif Technol.* 2021 Jan 15;255:117689.

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Team Leaders

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Dr. Ignacio Arechaga Iturregui
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Research Team

- Fernando Valenzuela, postdoctoral
- Tamara Menguiano Vázquez, predoctoral

Molecular Motors in Nanobiotechnology



Contact

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Dr. Ignacio Arechaga

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Publications

- Carranza G, Menguiano T, Valenzuela-Gómez F, García-Cazorla Y, Cabezón E, Arechaga I. Monitoring Bacterial Conjugation by Optical Microscopy. *Front Microbiol.* 2021 Oct 4;12:750200.
- Arechaga I, Cascales E. Editorial: Bacterial Secretion Systems, Volume II. *Front Microbiol.* 2022 May 24;13:917591.

Web site

<https://web.unican.es/ibbttec/i/ElenaCabezonLab>
<https://web.unican.es/ibbttec/i/IñakiArechagaLab>

Research Lines

- Molecular Motor, Antibiotic Resistance, Bacterial Secretion, Nanobiotechnology

Our research focuses on the study of molecular motors involved in the transport of DNA and proteins across biological membranes. These nanomachines convert chemical energy into mechanical work and are essential in numerous cellular processes. In order to understand the molecular mechanisms that govern their function, we employ techniques from molecular and structural biology, such as X-ray crystallography and electron microscopy. The goal is to transfer this knowledge to applications in the field of Biomedicine (molecular targets to inhibit the transmission of antibiotic resistance genes) and Nanobiotechnology (design of DNA sequencing platforms based on nanopore technology).

Grants

- Estudio del transporte de complejos ADN-proteína a través de membranas biológicas mediante técnicas de molécula individual (PID2019-104251GB-I00). PIs: Elena Cabezón e Ignacio Arechaga

Team Leader

Dra. Ana Victoria Villar Ramos
(UC Assistant Professor, PCD)

Research Team

- Ana Palanca Cuiñado, UC Assistant Professor (PAD)
- David Maestro Lavín, postdoctoral
- Luis Algeciras Jiménez, predoctoral
- Jorge Ruiz del Río, predoctoral
- Helena Soto Pérez-Cejuela, predoctoral
- Andrina Chambers, technician



RESEARCH LABORATORY FOR
MOLECULAR TREATMENTS
AGAINST CARDIAC FIBROSIS

Nano and Molecular Treatments Against (Cardiac) Fibrosis



Web site

<https://web.unican.es/ibbttec/i/AnaVillarLab>

Research Lines

- Myocardial Fibrosis, Therapeutic Biomolecules, Genetic Constructs, TGFbeta, Hsp90, Organoids, In Vivo Models of Fibrosis

The FIBROHEART research laboratory focuses on the application of pharmacological strategies based on the adaptation of nanovesicles, therapeutic biomolecules, or next-generation genetic constructs to combat the progression of fibrotic diseases primarily related to the heart. The pharmacological solutions under study are applied in miniaturized human organoids or in vivo models in which we study the molecular mechanisms underlying fibrotic disease and its cellular signaling cascades (mainly TGFbeta and Hsp90). Additionally, we address the study of other pathologies related to fibrosis (skin, lungs) to advance our understanding of the similarities between pro-fibrotic diseases.

Grants

- Biotransportador terapéutico basado en nanopartículas para el tratamiento de la fibrosis cardiaca humana en organoides (PID2021-125702OB-I00). PI: Ana V. Villar
- Therapeutic biotransporter for myocardial fibrosis (SUBVTC-2021-0011). PI: Ana V. Villar
- Estudio de la fibrosis asociada a COVID-19. Donación Fundación Figeva. PI: Ana V. Villar

Publications

- Ruiz del Río J, Muñoz P, Carreira P, Maestro D, Pablos JL, Palanca A, Merino J, Serrano-Mollar A, Merino R, Tamayo E, Lopez-Hoyos M, Diaz-Gonzalez F, Martinez-Taboada V, Villar AV. Profibrotic Role of Inducible Heat Shock Protein 90 α Isoform in Systemic Sclerosis. *J Immunol.* 2022 Jul 1;209(1):38-48.
- Groen J, Palanca A, Aires A, Conesa JJ, Maestro D, Rehbein S, Harkiolaki M, Villar AV, Cortajarena AL, Pereiro E. Correlative 3D cryo X-ray imaging reveals intracellular location and effect of designed antifibrotic protein-nanomaterial hybrids. *Chem Sci.* 2021 Oct 19;12(45):15090-15103.
- Algeciras L, Palanca A, Maestro D, Ruiz del Río J, Villar AV. Epigenetic alterations of TGF β and its main canonical signaling mediators in the context of cardiac fibrosis. *J Mol Cell Cardiol.* 2021 Oct;159:38-47.

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Immunology



Team Leader

Dr. Ramón Merino Pérez,
(CSIC Research Scientist)

Research Team

- Iván Gómez Herrero, technician

Chronic Inflammatory and Autoimmune Diseases

Contact

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Publications

- Carrillo Rodríguez P, Robles-Guirado JA, Cruz-Palomares A, Palacios-Pedrero MA, González-Paredes E, Más-Ciurana A, Franco-Herrera C, Ruiz-de-Castroviejo-Teja PA, Lario A, Longobardo V, Montosa-Hidalgo L, Perez Sanchez-Cañete M, Corzo-Corbera MM, Redondo-Sánchez A, Jodar AB, Blanco FJ, Zumaquero EC, Merino R, Sancho J, Zubiaur M. Extracellular vesicles from pristane-treated CD38-deficient mice express an anti-inflammatory neutrophil protein signature, which reflects the mild lupus severity elicited in these mice. *Frontiers in Immunology*. 2022; 13: 1013236.
- Ruiz del Río J, Muñoz P, Carreira P, Maestro D, Pablos JL, Palanca A, Merino J, Serrano-Mollar A, Merino R, Tamayo E, Lopez-Hoyos M, Diaz-Gonzalez F, Martinez-Taboada V, Villar AV. Profibrotic Role of Inducible Heat Shock Protein 90 α Isoform in Systemic Sclerosis. *J Immunol*. 2022 Jul 1;209(1):38-48.
- Martínez-Blanco Á, Domínguez-Pantoja M, Botía-Sánchez M, Pérez-Cabrera S, Bello-Iglesias N, Carrillo-Rodríguez P, Martín-Morales N, Lario-Simón A, Pérez-Sánchez-Cañete MM, Montosa-Hidalgo L, Guerrero-Fernández S, Longobardo-Polanco VM, Redondo-Sánchez S, Cornet-Gomez A, Torres-Sáez M, Fernández-Ibáñez A, Terrón-Camero L, Andrés-León E, O'Valle F, Merino R, Zubiaur M, Sancho J. CD38 Deficiency Ameliorates Chronic Graft-Versus-Host Disease Murine Lupus via a B-Cell-Dependent Mechanism. *Front Immunol*. 2021 Aug 24;12:713697.

Web site

<https://web.unican.es/ibbttec/i/RamonMerinoLab>

Research Lines

- Autoimmunity, Inflammation, BAMBI, Immunotherapy, CD4+ T Lymphocytes

We have recently demonstrated that the TGF β inhibitor BAMBI (BMP and Activin Membrane-Bound Inhibitor) regulates the differentiation of murine CD4+ T lymphocytes into Tregs (anti-inflammatory) and Th17 (pro-inflammatory) cells, modulating the development of autoimmunity. The research focus of our group is to analyze the potential of pharmacological inhibition of BAMBI in immunotherapy. To achieve this, a monoclonal antibody (mAb) against BAMBI has been developed, which has shown therapeutic effects in preclinical studies in various models of chronic inflammatory diseases (the technology developed by the group has resulted in a granted patent in the EU and US, and the creation of a spin-off company, Inhibitec-Anticuerpos S.L., which holds the license for the patent). Currently, we are proceeding with the modification of this mAb for its use in humans.

Grants

Characterization of new check-points inhibitors in cancer immunotherapy (PID2020-119567RB-I00). PI: Ramón Merino

Microbiology and genomics



Team Leader

Dr. Fernando de la Cruz,
(UC Full Professor)

Research Team

- Santiago Redondo, predoctoral
- Juan Manuel Medina, predoctoral
- Carolina Palencia Gándara, predoctoral
- Irene Sanz, predoctoral
- Ana Cuevas Venero, technician
- Sheila González Gutiérrez, technician

Intergenomics

Contact

Dr. Fernando de la Cruz

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Publications

- Robledo M, (...) de la Cruz F. Targeted bacterial conjugation mediated by synthetic cell-to-cell adhesions. *Nucleic Acids Res.* 2022 Dec 9;50(22):12938–12950.
- Fernández-Lopez R, de la Cruz F et al. Structural basis of direct and inverted DNA sequence repeat recognition by helix-turn-helix transcription factors. *Nucleic Acids Res.* 2022 Nov 11;50(20):11938–11947.
- Quèbre V, de la Cruz F et al. Characterization of the DNA Binding Domain of StbA, A Key Protein of A New Type of DNA Segregation System. *J Mol Biol.* 2022 Oct 15;434(19):167752.
- Webb HE, de la Cruz F et al. Genome Sequences of 18 *Salmonella enterica* Serotype Hadar Strains Collected from Patients in the United States. *Microbiol Resour Announc.* 2022 Oct 20;11(10):e0052222.
- Webb HE, de la Cruz F et al. Five Complete *Salmonella enterica* Serotype Reading Genomes Recovered from Patients in the United States. *Microbiol Resour Announc.* 2022 Jul 21;11(7):e0038822
- Rodríguez J, de la Cruz F et al. Isolation and phenotypic and genomic characterization of *Tetragenococcus* spp. from two Spanish traditional blue-veined cheeses made of raw milk. *Int J Food Microbiol.* 2022 Jun 16;371:109670.
- Santos-Merino M, de la Cruz F et al. *Synechococcus elongatus* PCC 7942 as a Platform for Bioproduction of Omega-3 Fatty Acids. *Life (Basel).* 2022 May 29;12(6):810.
- Coluzzi C, de la Cruz F et al. Evolution of Plasmid Mobility: Origin and Fate of Conjugative and Non-conjugative Plasmids. *Mol Biol Evol.* 2022 Jun 2;39(6):msac115.
- Cuartas R, de la Cruz F et al. PLASmid TAXonomic PCR (PlasTax-PCR), a multiplex relaxase MOB typing to assort plasmids into taxonomic units. *Methods Mol Biol.* 2022;2392:127–142.
- Palencia-Gándara C, (...) de la Cruz F. Conjugation Inhibitors Effectively Prevent Plasmid Transmission in Natural Environments. *mBio.* 2021 Aug 31;12(4):e0127721.
- Redondo-Salvo S, (...) de la Cruz F. COPLA, a taxonomic classifier of plasmids. *BMC Bioinformatics.* 2021 Jul 31;22(1):390.
- Medina JM, (...) de la Cruz F. Propionate Fermentative Genes of the Gut Microbiome Decrease in Inflammatory Bowel Disease. *J Clin Med.* 2021 May 18;10(10):2176.
- Alonso CA, de la Cruz F et al. Genomic Insights into Drug Resistance and Virulence Platforms, CRISPR-Cas Systems and Phylogeny of Commensal *E. coli* from Wildlife. *Microorganisms.* 2021 May 5;9(5):999.
- Delgado-Blas, de la Cruz F et al. Population genomics and antimicrobial resistance dynamics of *Escherichia coli* in wastewater and river environments. *Commun Biol.* 2021 Apr 12;4(1):457.
- Basauri A, de la Cruz F et al. Integrated strategy for the separation of endotoxins from biofluids. LPS capture on newly synthesized protein. *Sep Purif Technol.* 2021 Jan 15;255:117689.

Web site

<https://web.unican.es/ibbttec/i/FernandodelaCruzLab>

Research Lines

- Microbiology, Horizontal gene transfer, Systems biology, Synthetic biology, Bioinformatics

Horizontal gene transfer is a natural mechanism of genetic modification in bacteria. Our group studies mobile genetic elements, which are fundamental agents in this process. Using genomics and bioinformatics, we have developed tools capable of identifying and characterizing natural plasmids in environmental isolates. Based on these natural plasmids, we are developing genetic circuits through synthetic biology for modifying different bacterial species of biotechnological interest, such as *E.coli*, *Acinetobacter*, and *Synechococcus*.

Grants

- Microbiología y genómica de microorganismos de interés agrícola. Instituto Biomar S.A.
- Microbiología y genómica de microorganismos de interés Biotecnológico. Instituto Biomar S.A.
- Mapmar: marine plasmids driving the spread of antibiotic resistances (PCI2021–121978). PI: Fernando de la Cruz.
- Regional and global risk estimates for the emergence and persistence of *mdr* and *xdr* strains of enterobacterial human pathogens. 2021–2022. Centers for Disease Control and Prevention (CDC), USA. PI: Fernando de la Cruz
- Caracterización de compuestos activos contra el fitopatógeno emergente *xyella fastidiosa* para su protección intelectual. PI: Fernando de la Cruz
- Structure and Dynamics of *Salmonella* Plasmids and Their Involvement in the Dissemination of Antibiotic Resistance (0HCVD13–2019–38302). Centers for Disease Control and Prevention. PI: Fernando de la Cruz.
- Superioridad de los plásmidos (BFU2017–86378–P), AEI/FEDER,UE. PI: Fernando de la Cruz

Team leaders

Dr. Juan M. García Lobo,
(UC Full Professor)
Dr. Félix J. Sangari García,
(UC Assistant Professor, PCD)

Research Team

- Asunción Seoane Seoane, UC Associate Professor
- Candela González-Riancho, postdoctoral
- Yelina Ortiz Pérez, postdoctoral



Molecular Biology of Brucella Pathogenicity

Web site

<https://web.unican.es/ibbttec/i/JMGarciaLoboLAB>

Research Lines

- Brucellosis, Type IV Secretion Systems (T4SS), Environmental Microbiology, 16S Profiles, Metagenomics

In the field of *Brucella* virulence, we are interested in T4SS and the study and identification of translocated effectors. We also explore the role of membrane vesicles and regulation by sRNAs. In the field of environmental microbiology, we are interested in biodiversity analysis through sequencing and the characterization of “uncultivable” microorganisms for applied purposes. Since 2015, our group has been responsible for monitoring and controlling biodeterioration in the Altamira Cave.

Proyectos y contratos

- Control y seguimiento del biodeterioro y de las condiciones ambientales del agua de infiltración y de las emisiones de gas radón de la cueva de Altamira (2020C1000417). PI: Juan María García Lobo
- Servicio de control y seguimiento de las condiciones ambientales y del biodeterioro de la cueva de Altamira (2022C1000687- JS220047). PI: Juan María García Lobo

Publications

- Fernández-Remacha D, González-Riancho C, Lastra Osua M, González Arce A, Montánchez I, García-Lobo JM, Estrada-Tejedor R, Kaberdin VR. Analysis of laccase-like enzymes secreted by fungi isolated from a cave in northern Spain. *Microbiologyopen*. 2022 Apr;11(2):e1279.
- Díaz M, Quiroz-Moreno C, Jarrín-V P, Piquer-Esteban S, Monfort-Lanzas P, Rivadeneira E, Castillejo P, Arnau V, Díaz W, Sangari FJ and Molina CA. Soil Bacterial Community Along an Altitudinal Gradient in the Sumaco, a Stratovolcano in the Amazon Region. *Front For Glob Change*. 2022 March 24; 5:738568.

Contact

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Team Leader

Dra. María del Pilar Garcillán Barcia
(CSIC Tenured Scientist)

Research Team

- Arancha Peñil Celis, predoctoral
- Daniel García López, predoctoral
- Antonio Mesa Galán, predoctoral
- María del Mar Quiñonero Coronel, predoctoral

Functional Plasmidomics

Contact

Dra. María del Pilar
Garcillán Barcia

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Publications

- Castro-Gutierrez V, Fuller E, Garcillán-Barcia MP, Helgason T, Hassard F, Moir J. Dissemination of metaldehyde catabolic pathways is driven by mobile genetic elements in Proteobacteria. *Microb Genom.* 2022 Oct;8(10):mgen000881. doi: 10.1099/mgen.0.000881.
- Coluzzi C, Garcillán-Barcia MP, de la Cruz F, Rocha EPC. Evolution of Plasmid Mobility: Origin and Fate of Conjugative and Nonconjugative Plasmids. *Mol Biol Evol.* 2022 Jun 2;39(6):msac115.
- Garcillán-Barcia MP, Pluta R, Lorenzo-Díaz F, Bravo A, Espinosa M. The Facts and Family Secrets of Plasmids That Replicate via the Rolling-Circle Mechanism. *Microbiol Mol Biol Rev.* 2022 Mar 16;86(1):e0022220.
- Cuartas R, Coque TM, de la Cruz F, Garcillán-Barcia MP. PLASmid TAXonomic PCR (PlasTax-PCR), a multiplex relaxase MOB typing to assort plasmids into taxonomic units. *Methods Mol Biol.* 2022;2392:127-142.
- Delgado-Blas JF, Ovejero CM, David S, Montero N, Calero-Cáceres W, Garcillán-Barcia MP, de la Cruz F, Muniesa M, Aanensen DM, González-Zorn B. Population genomics and antimicrobial resistance dynamics of *Escherichia coli* in wastewater and river environments. *Commun Biol.* 2021 Apr 12;4(1):457.
- Dorado-Morales P, Garcillán-Barcia MP, Lasa I, Solano C. Fitness Cost Evolution of Natural Plasmids of *Staphylococcus aureus*. *mBio.* 2021 Feb 23;12(1):e03094-20.

Web site

<https://web.unican.es/ibbttec/i/MPGarcillanBarciaLAB>

Research Lines

- Plasmid Genomics, Synthetic Biology, Intercellular Communication Mediated by Plasmids, Plasmid Epidemiology

Plasmids are genomes with a profound impact on microbial communities, serving as a vital shared reservoir for adaptation to different environments. Through comparative plasmid genomics, we are identifying and studying key gene functions involved in intercellular communication, as well as those relevant to the emergence of outbreaks of multidrug-resistant bacteria. Additionally, we utilize some of these plasmid functionalities to construct synthetic genetic circuits that enable distributed computing in bacterial populations.

Grants

- Supremacía de los plásmidos (PID2020-117923GB-I00). Pls: M. Pilar Garcillán-Barcia and Fernando de la Cruz
- Novel Bacterial Polymers: Exploiting the Green Commons (BACTOPOL) (TED2021-129640B-I00). Pls: Daniel Pérez Mendoza and Juan Sanjuán (Estación Experimental del Zaidín, CSIC)

Team Leader

Dra. Matxalen Llosa Blas
(UC Full Professor)

Research Team

- Dolores Lucía Guzmán Herrador, postdoctoral
- Silvia Calero Martínez, predoctoral
- Andrea Fernández Gómez, predoctoral
- Sara Samperio Blázquez, predoctoral

Bacterial Type IV Secretion Systems



Web site

<https://web.unican.es/ibbttec/i/MatxalenLlosaLAB>

Research Lines

- Protein Secretion, DNA Conjugation, Site-Specific Integration, Genomic Engineering, Gene Therapy

Bacterial Type IV secretion systems (T4SS) are involved in both the secretion of virulence factors by pathogenic bacteria and the horizontal transfer of DNA between bacteria. Our group studies the molecular mechanism of substrate recruitment, particularly DNA recruitment. We aim to apply this knowledge to develop tools for DNA introduction and integration into specific human cell types. We can deliver DNA to human cells through T4SS of pathogenic bacteria, and the DNA is attached to a protein that promotes its subsequent integration into the human genome, giving it great potential as a genetic modification tool.

Grants

- Secreción de ADN de bacterias a células de mamífero. Análisis de su papel en virulencia y su potencial aplicación terapéutica (BIO2017-87190-R). PI: Matxalen Llosa.
- Viejas vías, nuevas herramientas: métodos basados en la conjugación bacteriana para modificar genéticamente células procariontas y eucariotas (PID2020-117956RB-I00). PI: Matxalen Llosa
- Modificación genética de cepas silvestres recalcitrantes de bacterias ácido-lácticas de interés comercial y biomédico mediante transferencia de proteínas Cas por conjugación (PDC2021-120967-I00). PI: Matxalen Llosa
- Genetic modification of wild type recalcitrant Bifidobacterium strains of commercial interest by intergeneric conjugation. Biopolis, S.L. PI: Matxalen Llosa

Publications

- Brom S, Grohman E, Llosa M. Editorial. *Plasmid*. 2021 Jan;113:102526
- Samperio S, Guzmán-Herrador DL, May-Cuz R, Martín MC, Álvarez MA, Llosa M. Conjugative DNA transfer from *E. coli* to transformation-resistant lactobacilli. *Front Microbiol*. 2021 Feb 11;12:606629.

Contact

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Team Leader

Dr. Raúl Fernández López
(UC Associate Professor – Beatriz Galindo)

Research Team

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Marina Domínguez Quintero, predoctoral
Ana González Guerra, predoctoral
Alfonso Mendaña Gómez, predoctoral
Raquel Gutiérrez Lanza, technician

Systems Microbiology

Contact

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Publications

- Basauri A, Fallanza M, Giner-Robles L, Fernández-López R, Moncalián G, de la Cruz F, Ortiz I. Integrated strategy for the separation of endotoxins from biofluids. LPS capture on newly synthesized protein. *Sep Purif Technol.* 2021 Jan 15;255:117689.
- Medina JM, Fernández-López R, Crespo J, Cruz F. Propionate fermentative genes of the gut microbiome decrease in inflammatory bowel disease. *J Clin Med.* 2021 May 18;10(10):2176.
- Palencia-Gándara C, Getino M, Moyano G, Redondo S, Fernández-López R, González-Zorn B, de la Cruz F. Conjugation inhibitors effectively prevent plasmid transmission in natural environments. *mBio.* 2021 Aug 31;12(4):e012772.
- Rodríguez J, González-Guerra A, Vázquez L, Fernández-López R, Flórez AB, de la Cruz F, Mayo B. Isolation and phenotypic and genomic characterization of *Tetragenococcus* spp. from two Spanish traditional blue-veined cheeses made of raw milk. *Int J Food Microbiol.* 2022 Jun 16;371:109670.
- Redondo-Salvo S, Bartomeus-Peñalver R, Vielva L, Tagg KA, Webb HE, Fernández-López R, de la Cruz F. COPLA, a taxonomic classifier of plasmids. *BMC Bioinformatics.* 2021 Jul 31;22(1):390.
- Fernández-López R, Ruiz R, Del Campo I, Gonzalez-Montes L, Boer DR, de la Cruz F, Moncalián G. Structural basis of direct and inverted DNA sequence repeat recognition by helix-turn-helix transcription factors. *Nucleic Acids Res.* 2022 Nov 11;50(20):11938–11947.

Web site

<https://web.unican.es/ibbttec/i/RaulFernandezLopezLAB>

Research Lines

- Computational Biology, Systems Biology, Synthetic Biology, Microbiology, Microfluidics, Microbiome, Cyanobacteria

Microorganisms exist in complex communities characterized by large flows of information and energy. In our laboratory, we employ experimental and computational approaches to uncover the principles governing these flows. Our long-term goal is to develop the necessary methods for a rational engineering of microbial communities, for both biomedical and biotechnological applications.

Grants

- Engineering synechococcus for and co2 and light-driven bioeconomy (TED2021-130689B-C31). PIs: Raúl Fernández López and Fernando de la Cruz
- Phage therapy to reduce Amr enterobacteria spread from a one health perspective (PCI2021-122067-2A). PI: Raúl Fernández López
- Biología de sistemas de la señalización en microorganismos (PID2019-110216GB-I00). PI: Raúl Fernández López

Neuropharmacology



Team Leader

Dr. Albert Adell
(CSIC Research Scientist)

Research Team

- Ekaterina Noskova, predoctoral

Systems Neurobiology

Contact

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Publications

- Cabanu S, Pilar-Cuellar F, Zubakina P, Florensa-Zanuy E, Senserrich J, Newman-Tancredi A, Adell A. Molecular signaling mechanisms for the antidepressant effects of NLX-101, a selective cortical 5-HT1A receptor biased agonist. *Pharmaceuticals (Basel)*. 2022 Mar 10;15(3):337.
- Garro-Martínez E. and Adell A. (2021) AMPA Receptor Potentiators as Potential Rapid-Acting Antidepressants. In: *New Rapid-acting Antidepressants*. Hashimoto K. and Manto M. (Eds.). Springer, Cham, pp. 85-109.
- Merino E, Raya-Salom D, Teruel-Martí V, Adell A, Cervera-Ferri A, Martínez-Ricós J. Effects of acute stress on the oscillatory activity of the hippocampus-amygdala-prefrontal cortex network. *Neuroscience*. 2021 Nov 10;476:72-89.
- Garro-Martínez E, Fullana MN, Florensa-Zanuy E, Senserrich J, Paz V, Ruiz-Bronchal E, Adell A, Castro E, Díaz Á, Pazos Á, Bortolozzi A, Pilar-Cuellar F. mTOR knockdown in the infralimbic cortex evokes a depressive-like state in mouse. *Int J Mol Sci*. 2021 Aug 12;22(16):8671.
- Pascual-Antón R, Blasco-Serra A, Muñoz-Moreno E, Pilar-Cuellar F, Garro-Martínez E, Florensa-Zanuy E, López-Gil X, Campa VM, Soria G, Adell A. Structural connectivity and subcellular changes after antidepressant doses of ketamine and Ro 25-6981 in the rat: an MRI and immuno-labeling study. *Brain Struct Funct*. 2021 Nov;226(8):2603-2616.
- Florensa-Zanuy E, Garro-Martínez E, Adell A, Castro E, Díaz Á, Pazos Á, Mac-Dowell KS, Martín-Hernández D, Pilar-Cuellar F. Cannabidiol antidepressant-like effect in the lipopolysaccharide model in mice: Modulation of inflammatory pathways. *Biochem Pharmacol*. 2021 Mar;185:114433.

Web site

<https://web.unican.es/ibbttec/i/AlbertAdellLAB>

Research Lines

- Depression, Animal Models, Serotonin, Glutamate, Intracerebral Microdialysis.

Our group studies new therapies for the treatment of depression, a mental illness that affects approximately 15% of the global population. Despite this, the currently used medications have limited efficacy due to two main factors: delayed onset of action and the existence of a population resistant to these treatments. However, there are new therapies that have a rapid effect, such as ketamine and deep brain stimulation (DBS). Our laboratory uses behavioral, biochemical, cellular, and molecular studies to unravel how these therapies work and discover new treatments with similar efficacy and reduced adverse effects.

Grants

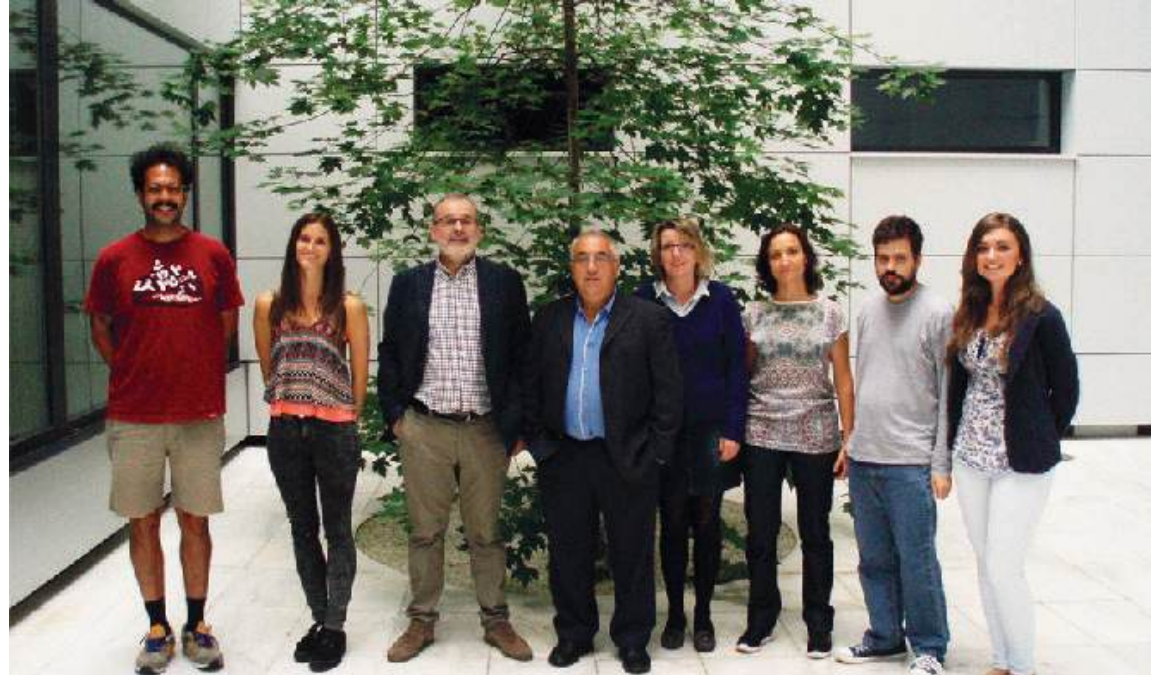
- Receptores AMPA como nuevas dianas moleculares para la obtención de antidepressivos de acción rápida (FIS PI19/00170). PI: Albert Adell

Team Leaders

Dr. Ángel Pazos Carro (UC Full Professor)
Dr. Álvaro Díaz Martínez (UC Associate Professor)

Equipo

- Elena Castro Fernández, UC Associate Professor
- Fuencisla Pilar Cuéllar, UC Assistant Professor (PAD)
- Eva Florensa Zanuy, postdoctoral
- Julia Senserrich Guerrero, predoctoral



Neuropharmacology

Web site

<https://web.unican.es/ibbttec/i/AngelPazosLAB>

Research Lines

- Depression, Serotonergic and Cannabinoid System, Neuroplasticity, Animal Models, Novel Therapeutic Targets

Our research lines are focused on studying the neurochemical and neuroplastic bases involved in the etiopathogenesis of neuropsychiatric disorders such as depression, investigating:

- The monoaminergic system in animal models of depression and its modulation by antidepressant drugs.
- Involvement of neuroplasticity and neurogenesis (Wnt/ β -catenin, mTOR, and BDNF pathways) in the etiopathogenesis and treatment of depression.
- Influence of obesity and inflammation on the neurobiology and treatment of depression.
- Studying the antidepressant effect of cannabidiol.

Grants

- Metaloproteínasa-9 y depresión: estudio en un modelo animal y en muestras cerebrales humanas *postmortem*, y papel en el mecanismo de acción de antidepresivos de acción rápida (RTI2018-097534-B-I00). PIs: Angel Pazos y Fuencisla Pilar-Cuéllar
- Caracterización de un modelo animal de depresión integrando obesidad e inflamación: efecto del cannabidiol (PID2021-127497OB-I00). PI: Fuencisla Pilar Cuéllar

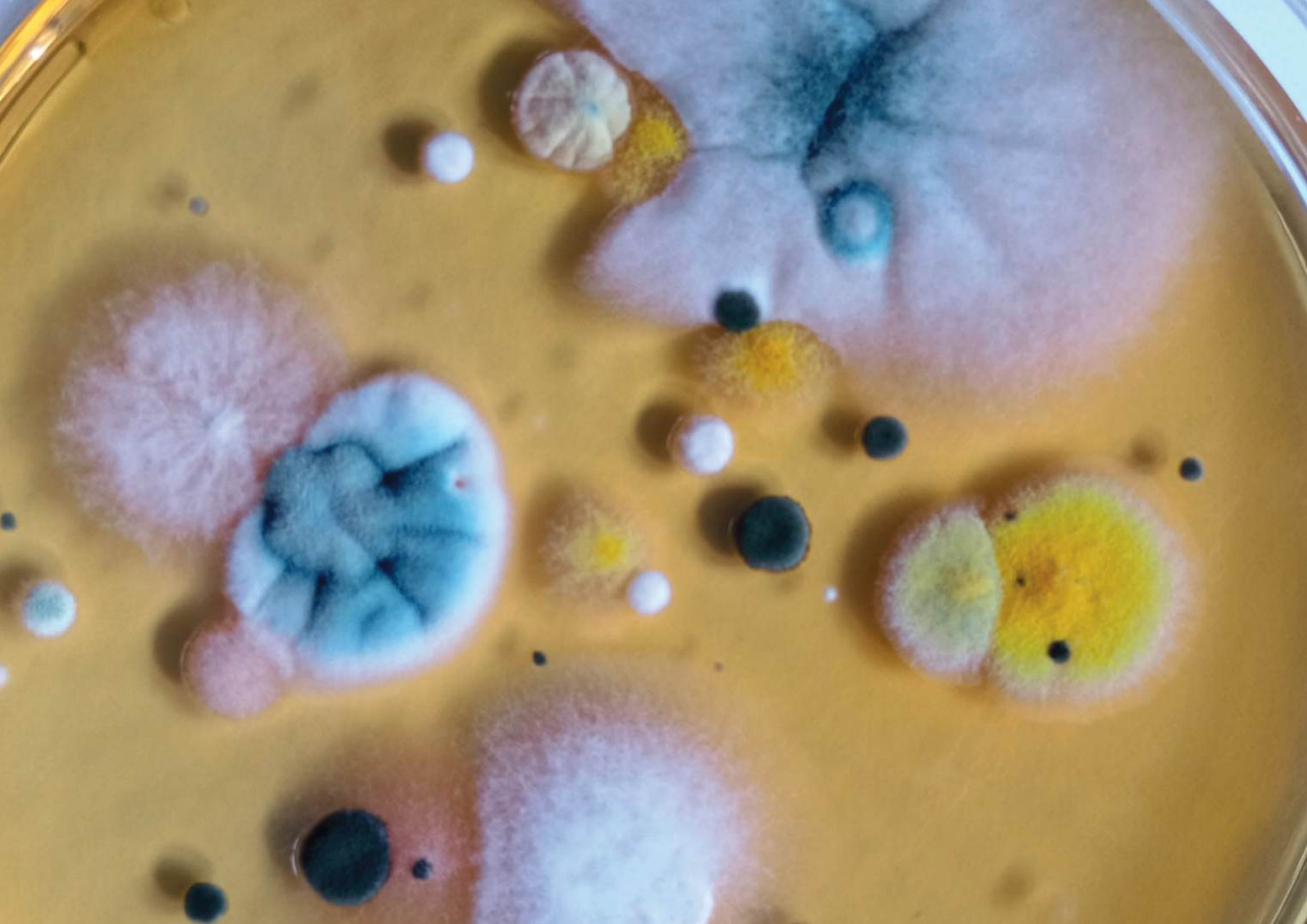
Publications

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Research Infrastructures and Facilities

3



IBBTEC stands out for being a scientific and technical hub with more than 6,000m² devoted to harboring modern facilities, including: radioactivity, microfluidics, cell culture, histology, biological containment laboratories of levels two and three (NCB-2 and NCB-3), and animal experimentation, among others. Besides, IBBTEC houses a Bio-incubator for

technology-based companies, which aims to become a benchmark for attracting high-impact projects, being a strategic tool for the development of the local biotechnology sector.

IBBTEC has a series of centralized services that support its researchers and are also available to external researchers and companies.



Massive Sequencing

The Massive Sequencing Service provides state-of-the-art technology to the scientific community, such as: genomic sequencing; RNAseq; small RNA analysis; microbiome analysis (16S RNA); and metagenomics. Equipment and expertise are available for library preparation for massive sequencing applications –mainly with Illumina technology–, data storage and basic bioinformatics analysis.

Scientific coordinator: Juan M. García Lobo

Technical staff: María Cruz Rodríguez

Pathogen-Free Animal Facility (SPF)

A Pathogen-Free Animal Facility is included in SEEA (Animal Housing and Experimentation Service) of the University of Cantabria. It is a singularity at the regional level, with a health status defined as SPF (Specific Pathogen Free), indicative of a high degree of sophistication in the management of laboratory animals and associated with cutting-edge biomedical research.

With an area of over 500 m², the SPF has the following facilities: Animal housing areas for different species; Laboratories for basic procedure development; Area for immunocompromised animals; Biosafety area for working with biological agents; Surgical area equipped with multiple operating rooms for experimental surgery development.

Coordinator: Miguel García Gómez (Veterinary Technical Director)

Transgenesis and Genome Editing

Transgenesis and Genome Editing provides means for the generation of genetically modified mouse lines. The service uses the facilities of the IBBTEC SPF Animal Facility and the Transgenesis Room. This service includes the equipment required for genotyping of post-electroporation mice; cryopreservation of embryos; maintenance of embryos in liquid N₂; sanitary rederivation of lines; and extraction and manipulation of early embryos.

Scientific coordinator: Marian Ros
Technical staff: Irene Mate





NCB-2 and NCB-3 Biosafety Laboratories

IBBTEC has an NCB-3 laboratory. This is one of the few laboratories with such operating characteristics in the country. The NCB-3 laboratory complies with the UNE 171400-1 standards and the provisions specified in Annex IV of RD 664/1997 and in Table IA of RD 178/2004 regarding the design of facilities, equipment, and work procedures. Four NCB-2 labs are also fully equipped and operative at IBBTEC. Two of them are cell culture laboratories, which are authorized to handle type 2 GMOs by the National Biosafety Commission (A/ES/21/I-49). One NCB-2 was fully equipped to work with plant pathogens, including a microfluidic station, funded by Agencia Estatal de Investigación (EQC2019-000705-C); and CSIC Interdisciplinary Platform on *Xylella fastidiosa*. All projects carried out in these facilities must have prior authorization from the IBBTEC Biosafety Commission and the corresponding Ethics Committees.

Scientific coordinators: Félix Sangari (*Brucella*) and Berta Casar (SARS-CoV-2).

The Biosafety commission is an advisory body whose role is to evaluate and supervise every activity posing potential biohazards, such as research projects dealing with genetically-modified organisms and potentially dangerous biological agents. The Biosecurity Commission is composed of:

President: Juan María García Lobo

Members: Fuencisla Pilar, Irene del Campo, María Lucas, Berta Casar, María Pilar Garcillán and Félix Sangari

Cell culture laboratories

The IBBTEC has two NCB-2 laboratories dedicated to cell cultures. These laboratories are equipped with laminar flow hoods and incubators with temperature, humidity, and CO₂ pressure control. To ensure a high-quality service, these facilities have controlled access and strict security and cleanliness measures to minimize the risk of external contaminations.

Scientific coordinator: Ignacio Varela

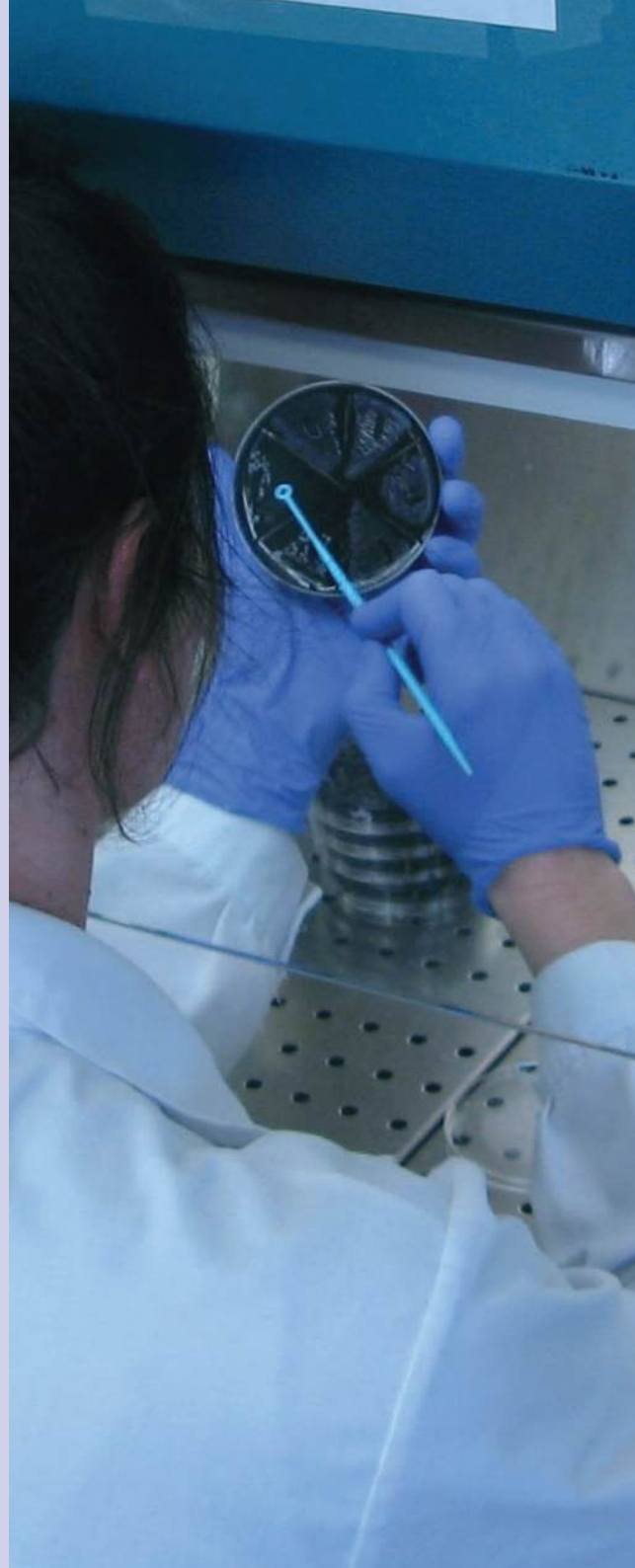
Radioactive Facility

IBBTEC houses part of the Radioactive Facility belonging to the UC School of Medicine. This facility is authorized by the Nuclear Safety Council (CSN) for the use of unencapsulated sources of radiation for research purposes, allowing the use of different radionuclides. It is equipped with leaded gas cabinets, scintillation counters for different emitters, hybridization ovens, and electrophoresis devices.

Technical staff: Irene del Campo

Advanced Optical Microscopy and Histology

This is a basic infrastructure of the IBBTEC used by 80% of its groups and other external biomedical research groups, both in Cantabria and other communities. It has advanced equipment, such as: a Leica SP5 spectral confocal microscope; a Nikon Ti2 equipped with a LED light source, a sCMOS camera and a beam splitter dedicated to live cell microscopy; or a slide scanner AxioscanZ1 from Zeiss equipped with fast-speed filter wheels for fluorescence. These can support projects requiring the most advanced microscopy



techniques to be undertaken, both in fixed samples and in living cells. Such as: tissue processing; multidimensional confocal and conventional fluorescence microscopy; combined with transmitted illumination (DIC, Ph, DF); FRET, FRAP; spectral separation; slide scanning (fluorescence and/or transmitted). This service has recently acquire a high-content microscopy platform (HCS/HCA) with the capacity to autonomously capture hundreds of thousands of epifluorescence or confocal images in multiwell plates and to process dozens of plates simultaneously to carry out gene or drug screenings on a small-medium scale.

Scientific coordinator: Juan Carlos Acosta
Technical staff: Víctor Manuel Campa

Within the department, there is a histology unit that offers the following services: Fixation of organs and tissues; Processing and embedding in paraffin, glutaraldehyde, or OCT for frozen tissues; Histological sectioning using microtomes or cryostats; Laser microdissection of sections; Performing conventional histological stains; Immunofluorescence and immunocytochemistry techniques.

Scientific coordinator: Ramón Merino

Protein Purification and Crystallization

IBBTEC has the resources to carry out projects for the expression and purification of proteins and macromolecular complexes, in order to obtain

samples with a high degree of purity, that allows conducting complex biochemical and structural tests. The service provides technical support and supervision throughout the entire purification process. In the case of requiring a structural analysis, it also offers technical support for the preparation of crystallization plates. It includes 4 liquid chromatography equipment; a press for cell disruption; ultracentrifuge; a wide range of purification columns; and bacterial and Baculovirus expression vectors; a crystallization room with two incubators; a server for data processing, and access to the XALOC line of the ALBA synchrotron (Barcelona).

Scientific coordinator: María Lucas

Microfabrication and Microfluidics

IBBTEC has the capacity to design and manufacture fluidic and electronic systems, allowing the development of its own technologies for biomedical applications, including: new experimental measurement systems; diagnostic devices or devices of biotechnological interest, lab-on-a-Chip applications; and development of fluidic and electronic macro-systems. It is equipped with everything necessary for the generation of PDMS chips from mold wafers, a high resolution 3D printer and devices that allow the development, among others, of Arduino® and Raspberry Pi® applications.

Scientific coordinator: Raúl Fernández



Research Support Laboratory (SAI)

This is a core facility that prepares reagents, solutions, and culture media to facilitate everyday progress of the ongoing research projects. Research support also includes DNA isolation and purification, and the preparation of high-performance competent bacterial cells for transformation, among others. In addition, the Support Laboratory is in charge of collecting, cleaning, and sterilizing the material of the research groups.

Scientific coordinator: M^a Pilar Garcillán

Technical staff: Matilde Cabezas, Sandra Zunzunegui, Carmen Pérez López

Purchasing, Equipment and Infrastructure Management

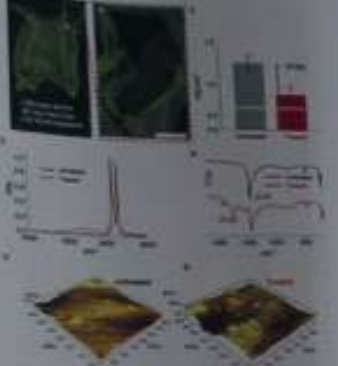
Purchasing and logistics management: Josefa Castillo
Equipment and occupational safety: Irene del Campo

OpenLAB

The OpenLAB bio-incubator offers 280 m² of pre-equipped laboratories; and between 30 to 75 m² of offices and meeting rooms. In addition, it affords access to all IBBTEC scientific and technological facilities and specialized technical personnel, thereby providing high-quality support services to the hosted companies.

Coordinator: Luis Miguel Lozano

Regeneration by Caterpillars of the wax moth *Galleria mellonella*



Regeneration of caterpillars after wounding is a complex process involving the formation of a protective cocoon and the subsequent development of a new caterpillar. This process is regulated by a series of signaling pathways, including the JAK/STAT pathway. The authors show that the JAK/STAT pathway is essential for the formation of the cocoon and the subsequent development of the new caterpillar. They also show that the JAK/STAT pathway is involved in the regulation of the expression of several genes, including those involved in the formation of the cocoon and the subsequent development of the new caterpillar.

Diagnostic Pathways Implicated in Virus-Positive and UV-Induced Merkel Cell Carcinoma

Merkel cell carcinoma (MCC) is a rare and aggressive skin cancer. The pathogenesis of MCC is complex and involves both viral and non-viral factors. The authors investigate the diagnostic pathways implicated in virus-positive and UV-induced MCC. They show that the JAK/STAT pathway is a key diagnostic pathway in virus-positive MCC. They also show that the PI3K/AKT pathway is a key diagnostic pathway in UV-induced MCC. The authors conclude that the JAK/STAT pathway and the PI3K/AKT pathway are key diagnostic pathways in MCC.

Autotuned parvovirus genome engineering and cancer reduction by translation-based iPSV/Cell delivery in mice

Parvovirus is a small DNA virus that has been used for gene delivery. The authors describe a method for autotuning the parvovirus genome for efficient gene delivery. They show that this method significantly improves the efficiency of gene delivery in mice. They also show that this method reduces the risk of cancer in mice. The authors conclude that this method is a promising approach for gene delivery and cancer reduction.

Protein evolution of DNA

The authors investigate the evolution of DNA proteins. They show that DNA proteins have evolved to recognize specific DNA sequences. They also show that DNA proteins have evolved to interact with specific DNA sequences. The authors conclude that DNA proteins have evolved to recognize and interact with specific DNA sequences.

Prospects & Overviews

Lysine methylation in cancer: SMYD3-MAP3K2 teaches us new lessons in the Ras-ERK pathway

By [Author Name]

Lysine methylation: Beyond trimethylation

Lysine methylation is a common post-translational modification of proteins. It is catalyzed by lysine methyltransferases (LMTs). The most well-studied LMT is SMYD3. SMYD3 is a member of the SET domain family of LMTs. SMYD3 is involved in the regulation of the Ras-ERK pathway. The authors show that SMYD3 is a key component of the Ras-ERK pathway. They show that SMYD3 is involved in the regulation of the expression of several genes, including those involved in the Ras-ERK pathway. The authors conclude that SMYD3 is a key component of the Ras-ERK pathway.

baepatologica

Increased gene numbers and copy number changes in breast cancer are a rapid target enrichment process

by [Author Name]

Gene copy number changes are a common feature of cancer. The authors investigate the process of target enrichment in breast cancer. They show that target enrichment is a rapid process. They also show that target enrichment is a common feature of breast cancer. The authors conclude that target enrichment is a rapid process in breast cancer.

Regulator Progression Controls

by [Author Name]

The authors investigate the role of regulator progression controls in cancer. They show that regulator progression controls are a key component of the Ras-ERK pathway. They also show that regulator progression controls are involved in the regulation of the expression of several genes, including those involved in the Ras-ERK pathway. The authors conclude that regulator progression controls are a key component of the Ras-ERK pathway.

Altered signaling through mTOR and PI3K

by [Author Name]

The authors investigate the role of mTOR and PI3K in cancer. They show that mTOR and PI3K are key components of the Ras-ERK pathway. They also show that mTOR and PI3K are involved in the regulation of the expression of several genes, including those involved in the Ras-ERK pathway. The authors conclude that mTOR and PI3K are key components of the Ras-ERK pathway.



4

Research Outputs

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PUBLICATIONS

Bibliometric analysis

During the years 2021 and 2022, researchers from IBBTEC have published a total of 84 articles, including original research and reviews, in internationally indexed journals in the Science Citation Index (SCI). Of these, 59 (70%) have appeared in journals included in the first quartile, and 32 (38%) in the top 10% (first decile) of their respective categories in terms of impact factor.

Twenty-three publications achieved an impact factor > 10 (27%), with two publications with IF > 25. The cumulative impact factor for 2021-2022 was 794, with an average impact factor of 9.5.

Over 60% of the publications resulted from international collaborations. Furthermore, there is a remarkable synergy and complementarity among the research groups at IBBTEC, and several publications are the result of internal collaborations. Our publications and contributions demonstrate IBBTEC's leadership and its ability to make a significant impact at the frontiers of knowledge.

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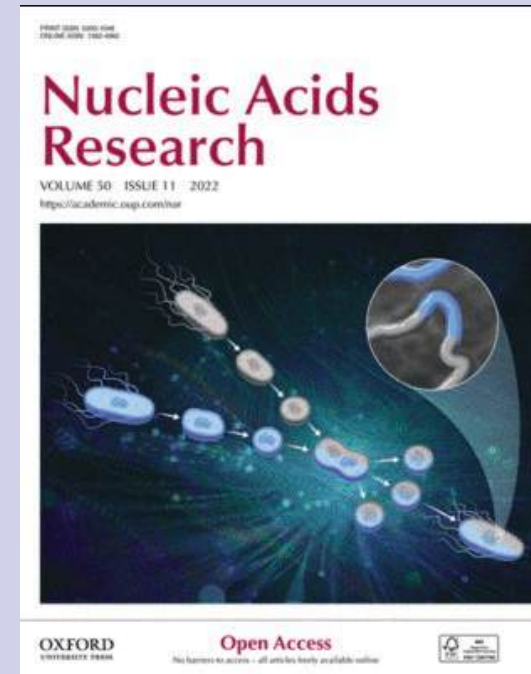
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4.2

PATENTS



In 2021-2022 period the following patents have been filed:

- Relaxase-Cas chimeric protein. M. Llosa, et al. UC, CSIC, Institut Pasteur. Cod. ES2897017B2. P202030890. Accepted 26 june, 2022.
- Monoclonal antibodies against BAMBI and use for the treatment of inflammatory diseases. P201531761. This patent that has been extended and accepted in the European Union (EP1641.1157) and USA (15/780800). R. Merino, J. Merino. CSIC and UC. PCT/ES2016/070852. Inhibitec-Anticuerpos S.L. holds the license for the exclusive use of this patent.

International public funding

- Harnessing Stromal Fibroblasts to Reduce Resistance and Improve Colon Cancer Therapeutics. ERC Consolidator Grant. 101045756. 2022-2027. PI: Fernando Calvo
- European Training Network (ETN): Empathy-molecular Basis of Human Enhanceropathies. Marie Skłodowska-Curie action (MSCA)-ITN-ETN; European Commission. 2020-2024. PI: Álvaro Rada Iglesias
- POISEDLOGIC-Dissecting the regulatory logic of poised enhancers. ERC Consolidator Grant. ERC-2019-COG-862022. 2020-2025. PI: Álvaro Rada Iglesias
- Molecular characterization of the role of intra-tumor heterogeneity in cancer progression and metastasis. ERC Starting grant 2014-637904. 2015-2020. PI: Ignacio Varela.
- Structure and dynamics of salmonella plasmids and their involvement in the dissemination of antibiotic resistance. 2019-2021. Centers for Disease Control and Prevention (CDC), USA. PI: Fernando de la Cruz
- Regional and global risk estimates for the emergence and persistence of mdr and xdr strains of enterobacterial human pathogens. 2021-2022. Centers for Disease Control and Prevention (CDC), USA. PI: Fernando de la Cruz
- Deciphering the role of PcG and TrxG as topological facilitators of enhancer function (EMBO). PI: Alvaro Rada

National competitive public funding

- Biotransportador terapéutico basado en nanopartículas para el tratamiento de la fibrosis cardiaca humana en organoides. PID2021-125702OB-I00. 2021-2024. PI: Ana V. Villar
- Estrategias para silenciar la comunicación entre los fibroblastos asociados a cancer y el microambiente. PID2021-128107OB-I00. PI: Fernando Calvo
- Identificación y caracterización de estrategias para modular la actividad de los fibroblastos asociados a cáncer para entorpecer el desarrollo tumoral. RTI2018-096778-A-I00. PI: Fernando Calvo
- Characterization of new check-points in cancer immunotherapy. PID2020-119567RB-I00. PI: Ramón Merino
- Metaloproteinasa-9 y depresión: estudio en un modelo animal y en muestras cerebrales humanas postmortem, y papel en el mecanismo de acción de antidepresivos de acción rápida. RTI2018-097534-B-I00. 2019-2022. PIs: Ángel Pazos and Fuencisla Pilar Cuéllar
- Caracterización de un modelo animal de depresión integrando obesidad e inflamación: efecto del cannabidiol. PID2021-127497OB-I00. 2021-2024. PI: Fuencisla Pilar Cuéllar
- Disección de la lógica reguladora de los potenciadores capacitados presentes en células pluripotentes. PGC2018-095301-B-I00. 2019-2021. PI: Álvaro Rada Iglesias
- Disección genética de la precisión transcripcional controlada por potenciadores. PID2021-123030NB-I00. 2021-2024. PI: Álvaro Rada Iglesias

4.3 FUNDING

- Conexiones entre las alteraciones en el complejo remodelador SWI-SNF y las rutas tumorales canónicas en cáncer de pulmón. PID2020-117539GB-I00. 2021-2024. PI: Ignacio Varela.
- Caracterización del papel del receptor del sistema inmune innato asociado a senescencia TLR2 en cáncer de pulmón. PID2020-117860GB-I00. PI: Juan Carlos Acosta
- Secreción de ADN de bacterias a células de mamífero. Análisis de su papel en virulencia y su potencial aplicación terapéutica. BIO2017-87190-R. 2018-2021. PI: Matxalen Llosa
- Viejas vías, nuevas herramientas: métodos basados en la conjugación bacteriana para modificar genéticamente células procariotas y eucariotas. PID2020-117956RB-I00. 2021-2024. PI: Matxalen Llosa
- Modificación genética de cepas silvestres recalibrantes de bacterias ácido-lácticas de interés comercial y biomédico mediante transferencia de proteínas Cas por conjugación. PDC2021-120967-I00. 2021-2023. PI: Matxalen Llosa
- La red MYC-MNT: nuevas interacciones y su impacto en neoplasias hematológicas. PID2020-115903GB-I00. 2021-2024. PIs: Javier León and M. Dolores Delgado
- Interacciones funcionales de MYC y CTCF en células de linfoma B agresivo y precursores hematopoyéticos. SAF2017-88026-R. 2018-2021. PIs: M. Dolores Delgado, Javier León Serrano
- Estudio de la función molecular del complejo Tor 1 en la división celular eucariota. PID2019-106745GB-I00. 2020-2024. PI: Alberto Sánchez
- Mechanism of Retriever action during HPV infection. PID2021-122611NB-100. 2021-2024. PI: María Lucas
- New mechanism for sorting and recycling of integral membrane proteins in endosomes. RTI2018-097801-B-I00. 2019-2022. PI: María Lucas
- Estudio del transporte de complejos ADN-proteína a través de membranas biológicas mediante técnicas de molécula individual. PID2019-104251GB-I00. 2020-2023. PIs: Elena Cabezón e Ignacio Arechaga
- Dorso-ventral polaridad de la extremidad y su implicación en morfogénesis y regeneración. PID2020-114525GB-I00. PI: Marian Ros
- Distribución espacial y dimerización de ERK: implicaciones en la carcinogénesis. RTI2018-096658-B-I00. PI: Piero Crespo
- Proteínas HOX como mediadores de las señales de la ruta RAS-ERK. PID2021-126288OB-I00. PI: Piero Crespo.
- Desarrollo de un biomarcador de la respuesta terapéutica del melanoma BRAF positivo. PDC2022-133569-I00. PI: Piero Crespo.
- Modificación de megasintasas para la producción de precursores químicos sostenibles. TED2021-129278B-I00. 2022-2024. PI: Gabriel Moncalián
- Megasintasas de ácidos grasos poliinsaturados: estructura, optimización y aplicaciones. Pry PID2021-122164NB-I00. 2021-2024. PI: Gabriel Moncalián
- Mapmar: marine plasmids driving the spread of antibiotic resistances. PCI2021-121978. 2021-2024. PI: Fernando de la Cruz
- Superioridad de los plásmidos. BFU2017-86378-P. 2018-2021. PI: Fernando de la Cruz

- Engineering synechococcus for and CO2 and light-driven bioeconomy. TED2021-130689B-C31. 2022-2024. PIs: Raul Fernández López y Fernando de la Cruz
- Phage therapy to reduce Amr enterobacteria spread from a one health perspective. PCI2021-122067-2A. 2021-2024. PI: Raúl Fernández López
- Definir el mecanismo de activación de CDCP1 para bloquear metástasis de cáncer de mama triple negativo. PID2020-112760RB-I00. 2021-2024. PI: Berta Casar
- Descifrando el mecanismo molecular de las sintasas de ácidos grasos poliinsaturados PGC2018-093885-B-I00. 2018-2021. PI: Gabriel Moncalián
- Estudio in vivo de terapias moleculares de diseño y un nano-transportador genéticamente modificado como sistema específico contra la fibrosis cardiaca RTI2018-095214-B-I00. 2019-2022 PI: Ana V. Villar
- Biología de sistemas de la señalización en microorganismos. PID2019-110216GB-I00/ AEI/10.13039/501100011033. 2020-2023. PI: Raúl Fernández López
- Supremacía de los plásmidos. PID2020-117923GB-I00. 2021-2024. PI Fernando de la Cruz
- Servicio de control y seguimiento de las condiciones ambientales y del biodeterioro de la cueva de Altamira. 2022C1000687- JS220047. 2018-2024. PI: Juan María García Lobo
- CIBERSAM: Convenio de colaboración entre el centro de investigación biomédica en red de salud mental y la Universidad de Cantabria. PI: A.Pazos
- Repurposing MAPK inhibitors for the treatment of COVID-19 (202020E113). Proyecto intramural PTI salud Global CSIC. CSIC-COV19-095. PIs: Piero Crespo y Berta Casar
- Mecanismos moleculares que determinan la resistencia a quimioterapia en neuroblastoma. Berta Casar. Proyecto Intramural Especial PIE 201412 5 9. 2021-2022. PI: Berta Casar
- Repurposing MAPK inhibitors for the treatment of COVID-19. SG2103031_2107300020. PI: Piero Crespo
- CIBERONC: Convenio entre el CSIC y el centro de investigación biomédica en red -ciber- para la colaboración entre ambas instituciones PI: Piero Crespo
- Identificación de nuevas moléculas inhibidoras de la dimerización de ERK. PI: Piero Crespo
- Estudio de la interacción MEK-ncRNA en melano- ma PI: Piero Crespo
- Receptores AMPA como nuevas dianas moleculares para la obtención de antidepresivos de acción rápida. PI: Albert Adell PI19/00170
- Ayudas extraordinarias para la preparación de proyectos 2020 BFU2017-88265-P PI: Marian Ros
- Ayudas extraordinarias para la preparación de proyectos 2020.SAF2017-82905-R. PI: Ramón Merino
- Ayudas extraordinarias para la preparación de proyectos 2021.RTI2018-096658-B-I00. PI: Piero Crespo
- Ayudas extraordinarias para la preparación de proyectos 2021.RTI2018-096778-A-I00. PI: Fernando Calvo
- Desarrollo de un dispositivo microfluídico para investigar el papel de los fibroblastos asociados a cáncer (CAFs). PI: Fernando Calvo

Regional competitive public funding

- Therapeutic biotransporter for myocardial fibrosis. SUBVTC-2021-0011. Gobierno de Cantabria. Universidad de Cantabria. 2022. PI: Ana V. Villar
- Terapia de protección telomérica para la enfermedad covid19. 2020-2021. PI: Ana V. Villar
- Caracterización de compuestos activos contra el fitopatógeno emergente xylella fastidiosa para su protección intelectual. 2022. Financiado por Universidad de Cantabria y Gobierno de Cantabria. PI: Fernando de la Cruz
- Reposicionamiento de inhibidores de MAPK para tratamiento de COVID-19 (2020UIC22-PUB-0008). Gobierno de Cantabria. PIs: Piero Crespo y Berta Casar
- Microbiología y genómica de microorganismos de interés agrícola. 2018-2022. PI: Fernando de la Cruz
- Análisis del microbioma del trigo y selección de microorganismos beneficiosos para su incorporación a semillas. 2019-2022. PI: F. de la Cruz
- Estudio lipídico y proteómico de distintas terapias antidepresivas en modelos animales y muestras humanas. 2022-2025. PI: Albert Adell
- Transcriptional regulation during vertebrate embryonic patterning: from genomics to mechanism. 2018-2023. PI: Alvaro Rada.
- Inhibidores de dimerización de ERK: evaluación del potencial antitumoral de nuevas formulaciones SUBVTC-2022-0025. PI: Piero Crespo

Non-competitive regional public funding

- Bioamenazas emergentes: cáncer, bacterias multiresistentes y coronavirus (Financiado Contrato

Programa: Consejería de Universidades, Igualdad, Cultura y Deporte del Gobierno de Cantabria - UC). 2020-2022. PI: Piero Crespo

- Ensayo de interferencia viral para el descubrimiento de nuevos electores en Brucella (Consejería de Universidades, Igualdad, Cultura y Deporte del Gobierno de Cantabria-UC) 2020-2021. PI: Félix Sangari

Private funding

- Multidisciplinary dissection of the chemotherapy resistance mechanisms in triple negative breast cancer: A step towards improved clinical care. PRYCO-211372RODR. AECC - Coordinated Projects. 2021-2026. PIs: Ignacio Varela, Fernando Calvo.
- Targeting cancer-associated fibroblasts using HDAC inhibitors to improve therapies for breast, ovarian and colon cancers. LABAE19044CALV. AECC. 2019-2023. PI: Fernando Calvo.
- Development of a therapeutic response marker for metastatic melanoma. FERO XXI BFERO2103. 2021-2023. PI: Berta Casar
- Cortocircuitar el microambiente tumoral para entorpecer el desarrollo de cánceres agresivos. IN[19]_BBM_BAS_0076. Periodo de financiación: 2019-2021 (incluyendo una extensión de 6 meses por COVID-19). Entidad financiadora y tipo de ayuda: BBVA Leonardo Awards 2019. PI: Fernando Calvo.
- Microbiología y genómica de microorganismos de interés agrícola. 2018-2022. Instituto Biomar, S.A. PI: Fernando de la Cruz

- Multidisciplinary dissection of the chemotherapy resistance mechanisms in triple negative breast cancer: a step towards improved clinical care. AECC 2021. PIs: Ángel Nebreda, Juan Miguel Cejalvo, Ignacio Varela, Fernando Calvo.
- Genetic modification of wild type recalcitrant Bifidobacterium strains of commercial interest by intergeneric conjugation. Biopolis, S.L. 2021-2022
- Equipamiento para laboratorios de apoyo a la investigación del IBBTEC. Ayudas para la adquisición y renovación de equipamiento científico-técnico de uso exclusivo para la I+D en la Universidad de Cantabria, convocatoria 2022. PIs: Javier León, M. Dolores Delgado.

R&D Contracts

- Contrato INGECID Desarrollo tecnológico de un equipo para la eliminación del virus SARS-COV-2. PI: Félix Sangari 2020- 2021
- Contrato Arcelormittal. Analisis metagenómico de genes de resistencia a antibióticos a muestras humanas. PI: Ignacio Varela. 2021-2022
- Contrato Biopolis. Genetic modification of wild type recalcitrant bifidobacterium strains of commercial interest by intergeneric conjugation. PI: Matxalen Llosa 2021-2022.
- Contrato Torrecid: Determinación de la actividad antivirica frente al SARS-CoV-2 en superficies cerámicas. PI: Berta Casar 2021-2022

Infrastructure and equipment

- Microscopy platform with super-resolution and high content analysis (HCA) capabilities. EQC2021-007165-P. MCIN/AEI/10.13039/501100011033 y por la Unión Europea “NextGenerationEU”/PRTR). 2021- 2023. PIs: Ignacio Varela (PI), Piero Crespo, Marian Ros, Raul Fernández, Fernando Calvo, Juan Carlos Acosta.

Other grants received

- Ramón y Cajal, Beatriz Galindo and Juan de la Cierva Programms additional allocation
- María Zambrano and Margarita Salas contracts
- University of Cantabria, FPI and FPU predoctoral contracts
- CSIC JAE-Intro fellowships
- Technician contracts



Donations

IBBTEC has received various donations throughout 2021 and 2022:

- Project: «Microorganismos patógenos: actividades y difusión». PI: Félix Sangari. 10.000 €
- Donation for the support of molecular treatments against heart fibrosis -FIBROHEART. PI: Ana Villar. 3.000 €
- Donation of a CO₂ incubator by BMC Assurance. 2021. PI: Piero Crespo. 4.500 €
- Donation ASPLA-Plásticos Españoles S.A. 2021-2022. PI: Piero Crespo. 25.000 €

5

Internacionalization

IBBTEC demonstrates outstanding international leadership, as reflected through different actions:

Several research groups at IBBTEC have obtained highly competitive funding through international projects (see details in the grants section). It is worth highlighting that in recent years, IBBTEC researchers have obtained three projects from the European Research Council (ERC), two of which are still ongoing:

- ERC Consolidator Grant 2022-2027. Harnessing Stromal Fibroblasts to Reduce Resistance and Improve Colon Cancer Therapeutics. PI F. Calvo.
- ERC Consolidator Grant 2020-2025. Poised-logic-dissecting the regulatory logic of poised enhancers. PI A. Rada.
- ERC Starting grant. 2015-2020. Molecular characterization of the role of intra-tumor heterogeneity in cancer progression and metastasis. PI I. Varela.

The majority of articles published by IBBTEC research groups are collaborations with foreign groups.

Visits of IBBTEC researchers to foreign centers: all IBBTEC staff researchers have broad connections with foreign groups worldwide. All of them have received postdoctoral training abroad, and many have had sabbatical or shorter stays to begin or consolidate collaborations. Likewise, all the newly incorporated staff researchers have concluded long stays abroad. This facilitates IBBTEC graduate students access to foreign labs for their training, as evidenced by 75% of theses obtaining the “International Commendation”.

- IBBTEC researchers are frequently invited as speakers in international meetings and seminars at research institutions worldwide. Similarly, foreign researchers are invited to give seminars or undertake research stays at our facilities.

EUNICE European University

UC is a member of EUNICE (European University for Customized Education), an EU initiative resulting in the alliance of seven European universities, to make higher education more competitive. One of EUNICE aims is to foster joint research initiatives among its members, from which IBBTEC should benefit in the near future. In this respect, two of IBBTEC staff: Prof. M. Llosa, as UC Internationalization ViceRector, and Prof. G. Moncalián, as Area Director, are EUNICE coordinators at UC, and are Principal Investigators (PIs) or participants in the following European projects (managed by the UC's SGI):

- EUNICE - EUROPEAN UNIVERSITY FOR CUSTOMISED EDUCATION. Proyecto Erasmus + Iniciativa Universidades Europeas 101004083 - EUNICE - EAC-A02-2.
- PEER-IR-VIEW: Programa Erasmus + Asociación Estratégica 2020-1-FR01-KA203-080322
- REUNICE- RESEARCH WITH AND FOR SOCIETY IN EUNICE H2020-IBA-SfS-2- 2020-101035813

Visits of foreign researchers to IBBTEC

The Institute frequently hosts international researchers, who have stayed with us for variable periods of time either to perform master's, doctoral or postdoctoral projects.

During this period, IBBTEC has hosted the following foreign researchers:

- Tomás Pachano. U. Cologne. Germany
- Marta Łaciak. U. Warmia. Poland
- Sharon Cabanu. U. Milan. Italy
- Lorenzo Francesco Cappuccio. U. Milan. Italy
- Dory Vergallo. U. Milán. Italy
- Diane Coursier, U. Rennes, France
- Carla Portulano. U. degli Studi Milan. Italy
- Khouloud Saidi. P. School. Tunis.
- Nancy Heidy Cahuana Santamaría. U. Cantabria. Bolivia
- Aileen Kerfin. U. Tubingen. Germany
- Nataly Emperatriz Pérez González. U. Carobobo. Venezuela
- Danielle Novillo Quirola. U. P. Salesiana. Ecuador.
- Andrina Chambers. U. National. Ireland.
- Martín Alejandro Hernández. Argentina.
- Daniela Cristina Ortiz Bravo. U. P. Salesiana. Ecuador
- Ekaterina Noskova, U. Perm. Russia.
- Noema Jaffré. U. Pau et des Pays de l'Adour. France
- Magdalena de los Ángeles Díaz Altamirano. Ecuador
- Thalia Soto Salazar, U. La Habana. Cuba
- Sarah Robert, U. Rennes. France
- Mitsuru Honda. U. Kyoto, Japan.
- Marianna Iliadou, U. Patras, Greece.





6

Scientific Events and Seminars

SCIENTIFIC EVENTS AND SEMINARS

Among its training activities, IBBTEC offers an ample program of seminars. Talks are always in English. It includes, External Seminars: talks delivered by outstanding national and foreign scientists, covering a broad range of topics relevant to research ongoing at IBBTEC.

Progress Reports

IBBTEC Progress reports are aimed at fostering graduate student's communication skills. Once a year students must give a talk reporting the progress of their projects.

Progress Reports 2021

- 13th January: Patricia Carnicero and Juan Manuel Medina
- 20th January: Jorge Ruiz and Aurora Martín
- 27th January: Dalia de la Fuente
- 3th February: Esther Tamayo
- 10th February: Sara Lucas
- 17th February: Marta Morante
- 24th February: Victor Gaya
- 3rd March: Tamara Menguiano and María Subijana
- 10th March: Sofía Zdral and Jesús Galán
- 17th March: Luis Algeciras and Silvia Domínguez
- 24th March: Lara Lizbeth (Idival) and Roger Bartomeus

- 31th March: Júlia Senserrich and Arancha Peñil
- 15th April: Diane Coursier and Andrea Díaz
- 22th April: Beatriz Rodríguez and Alfonso Mendaña
- 20th October: Miguel Baez Martín
- 27th October: Lucía San Juan (Idival) and Lorena García Gaipo
- 3th November: Patricia Carnicero and Ana González Guerra
- 10th November: Tomás Pachano
- 1st December: Mariana Iliadou
- 15th December: Juan Manuel Medina and Iris Aja (Idival)

Progress Reports 2022

- 19th January: Lizbeth Contreras (Idival) and Sarah Robert
- 26th January: Jorge Ruiz del Río
- 16th February: María de Mar Quiñonero and Jesús



- Galán (Idival)
- 23th February: María Mariner Fauli
- 2nd March: Alfonso Mendaña Gómez
- 9th March: Catalina Capo and Alejandro Ibeas
- 16th March: Beatriz Monterde and Dolores Lucía Guzmán
- 23th March: Sofía Zdral Noguero and Endika Haro
- 30th March: María Subijana and Aurora Martín
- 6th April: Tamara Menguiano and Thais Ealo
- 13th April: Vanessa Junco and Silvia Domínguez
- 4th May: Diane Coursier and Arancha Peñil Celis
- 11th May: Laura Ruiz and Luis Algeciras
- 18th May: Irene Sanz and Beatriz Rodríguez
- 25th May: Magdalena Foltman and Daniel Molina
- 1st June: Lara Zorro and Paula Pérez (Inhibitec)
- 26th October: Jorge Ruíz del Río
- 2nd November: Dolores Guzmán and Jose Luis Castaño Peregrín (Idival)
- 9th November: Endika Haro
- 16th November: Sarah Robert
- 23th November: Magdalena Foltman
- 30th November: Arancha Peñil
- 14th December: Yelina Ortiz and Helena Soto
- 21th December: Juan Manuel Medina and M^a del Mar Quiñonero

Doctorate seminars

As instructed in the UC Molecular Biology and Biomedicine Doctorate Program, previous to their thesis presentation students must give a talk on the unfolding of their project.

Doctorate seminars 2021

- 26th November: David Maestro Lavín (dir. A. Villar)
- 24th November: Marta Morante (dir. P. Crespo)

Doctorate seminars 2022

- 2nd February: Fernando Valenzuela (dir. E. Cabezón/I. Arechaga)
- 9th February: Laura Quevedo (dir. N. Varela)
- 27th April: Júlia Senserrich Guerrero (dir. A. Pazos)
- 11th November: Santiago Redondo (dir. F. de la Cruz)

OPENLAB conferences

OpenLAB organizes the OpenLab-IBBTEC Scientific Transfer and Entrepreneurship Conferences, a series of talks focused on different areas of the innovation process in biomedicine and biotechnology: a) Financing of technology transfer processes; b) Creation of Biotechnology-Based Companies; c) Intellectual Property, and d) Science and Professional Career.

Other OPENLAB-organized conferences include:

-Ramón Areces Foundation-IBBTEC-CRE. “Careers for Scientists”.

-IBBTEC-GENESIS BIOMED. Biotransfer Cantabria.

-IBBTEC-IBM-Government of Cantabria. “Artificial Intelligence in the Biomedical Sector”.

-Chamber of Commerce-IBBTEC

These have open attendance and have attracted an average of 100-150 participants.

Other activities

Seminars and conferences by IBBTEC researchers:

- Imaging and Monitoring Tumour Burden Session - 18th Aseica International Congress (Santiago de Compostela, Spain). 2022. F. Calvo. Chair

- Department of Life Science - Brunel University London – London, UK. Invited by Dr Barbara Tanos. 2022. F. Calvo

- Keynote speaker at yICSA meeting in Blizard Institute, QMUL, London, UK. May 2022. JC Acosta

- 10th ESLHO Symposium: Monitoring immunotherapies: Basis for Companion Diagnostics? Leiden, The Netherlands. 11-12 November 2021 JC Acosta

- Deciphering Lmx1b regulation during development and evolution” August 7-11, 2022 Cambridge, Massachusetts, USA. M. Ros

- SITE VISIT: member of the committee responsible for evaluating the Anatomy Doctorate program

JORNADAS DE TRANSFERENCIA Y EMPRENDIMIENTO CIENTÍFICO 2021 OPENLAB-IBBTEC

MARZO-JUNIO 2021

22 DE MARZO
"CREACIÓN DE EMPRESAS DE BASE TECNOLÓGICA"
JUDITH SALADRIGAS, SOCIA DEL AREA DE INNOVACIÓN Y EMPRENDIMIENTO EN DWF-RGD

20 DE ABRIL
"FINANCIACIÓN DE PROCESOS DE TRANSFERENCIA DE TECNOLOGÍA"
ROGER PIQUÉ, FUNDADOR Y DIRECTOR DE INVERSIONES DE INVEREADY

18 DE MAYO
"ENSAYOS CLÍNICOS: ASPECTOS REGULATORIOS EN BIOMEDICINA"
AMELIA MARTÍN URANGA, PLATAFORMA TECNOLÓGICA ESPAÑOLA DE MEDICAMENTOS INNOVADORES
MARÍA DEL CARMEN DE LA CRUZ ARGUEDAS, UCAICEC, INSTITUTO DE INVESTIGACIÓN SANITARIA DEL HOSPITAL GREGORIO MARAÑÓN

18 DE JUNIO
"CIENCIA Y CARRERA PROFESIONAL"
PATRICIA FORGÉN, TECNÓLOGA SENIOR, FUNDADORA DE CERU

GOBIERNO DE CANTABRIA
SODECAON
UC UNIVERSIDAD DE CANTABRIA
CSIC
OPEN LAB

SEBBM Elevator Pitch Online



Fernando Calvo



29
octubre



Laura Quevedo

Si queréis enviar preguntas o comentarios para los ponentes a través de Twitter, no olvidéis usar el hashtag #SEBBM-EP



Victor Sánchez-Gaya



Diane Coursier



Rocio Garcia-Gómez



Berta Casar



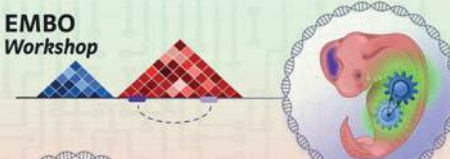
Ana Herrero

Viernes, 29 de octubre de 2021 a las 12.00 CET a través del canal de YouTube de la SEBBM

Loma Linda University School Of Medicine. Division Of Human Anatomy. 2022 M. Ros

- Plasmids around the Globe 2021 F. de la Cruz
- Progress meeting – 25 November, Bruselas del proyecto europeo FULL FORCE.2021 F. de la Cruz
- International symposium Salmonella and salmonellosis Saint-Malo, Francia. 2022 “Pathways of gene dissemination within the Salmonella enterica plasmidome”. F. de la Cruz
- International Symposium on Plasmid Biology Toulouse, France. “Plasmid Taxonomy” 2022. F. de la Cruz
- ESCMID Online Postgraduate Course. 2022. F. de la Cruz
- Centers for Disease Control and Prevention (CDC), Atlanta. 2022. F. de la Cruz
- Reunión proyecto Phage-STOP-AMR meeting Berlin. 2022. F. de la Cruz

EMBO Workshop








Enhanceropathies: Understanding enhancer function to understand human disease

25–28 May 2020 | Santander, Spain

<p>ORGANIZER Álvaro Rada-Iglesias Institute of Biotechnology, CSIC</p> <p>CO-ORGANIZERS Salvatore Spicuglia The Children's Hospital of Philadelphia, PA</p> <p>Susanne Mandrup University of Copenhagen, Denmark, DK</p> <p>REGISTRATION Application deadline 3 April 2020</p> <p>Student/Postdoc 525 EUR Academic..... 600 EUR Industry..... 750 EUR</p> <p>CONTACT alvaro.rada@ufc.es</p>	<p>SPEAKERS</p> <p>Ana Claudia Marques University of Coimbra, PT</p> <p>Ana Pombo Molecular Medicine, ES</p> <p>Axel Visel University of California, CA</p> <p>Bart Deplancke The Children's Hospital of Philadelphia, PA</p> <p>Christa Bücker The Children's Hospital of Philadelphia, PA</p> <p>Christopher Glass University of California, CA</p> <p>Dario Llopiz The Children's Hospital of Philadelphia, PA</p> <p>Cerd Blobel The Children's Hospital of Philadelphia, PA</p> <p>Claudia Natoli The Children's Hospital of Philadelphia, PA</p>	<p>Joanna Wysocka The Children's Hospital of Philadelphia, PA</p> <p>Jorge Ferrer The Children's Hospital of Philadelphia, PA</p> <p>Joris Van Arensbergen The Children's Hospital of Philadelphia, PA</p> <p>José Luis Gómez-Skarmeta The Children's Hospital of Philadelphia, PA</p> <p>Judith Zaugg The Children's Hospital of Philadelphia, PA</p> <p>Marian Ros The Children's Hospital of Philadelphia, PA</p> <p>Pelin Sahlen The Children's Hospital of Philadelphia, PA</p> <p>Robin Andersson The Children's Hospital of Philadelphia, PA</p>	<p>Stefan Mundlos The Children's Hospital of Philadelphia, PA</p> <p>Tatjana Sauka-Spengler The Children's Hospital of Philadelphia, PA</p> <p>Wendy Wickmore The Children's Hospital of Philadelphia, PA</p> <p>Wouter de Laat The Children's Hospital of Philadelphia, PA</p>
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meetings.embo.org/event/20-enhanceropathies

Meetings organization

- EMBO Workshop “Enhanceropathies: understanding enhancer function to understand human disease. Co-organizer: Álvaro Rada Iglesias. Santander: 6-9 october 2021 Organizer EMBO. Workshop internacional, 100 participants
- IX Encuentro virtual “Webinar SEBBM - Elevator Pitch” – IBBTEC. Organizer: Fernando Calvo. Online (https://www.youtube.com/watch?v=8_AQTu56_bM) 29/10/2021 Organizer: SEBBM. 286 visits
- Workshop on Plasmids as Vehicles of Antimicrobial Resistance Spread. Coordinator Fernando de la Cruz Calahorra. Trieste (Italy) Virtual Meeting: 21-25 march 2022. Organizer: ICTP (International Centre for Theoretical Physics)
- Symposium: Control of Shape and of Size during Limb Skeletal Development and Repair. Co-sponsored by *Developmental Dynamics*. 2021. Organizer: Marian Ros



- ETN: European Training Network “Enhpathy” meetings, Santander, Spain. 2022. Organizer: Álvaro Rada

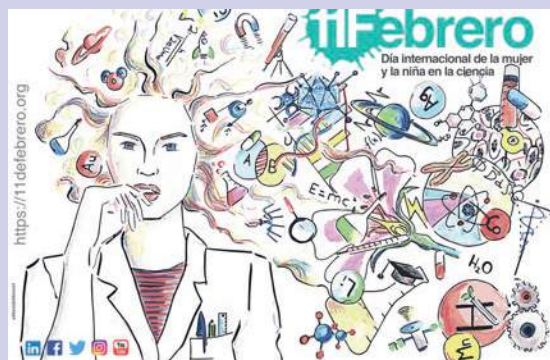
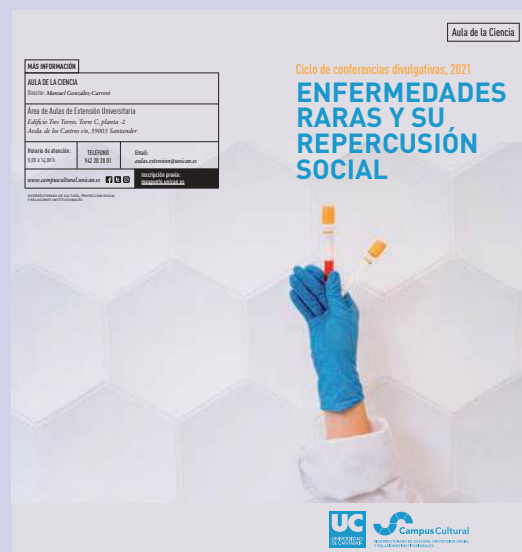


Awards and other recognitions

- Ana V. Villar: “Leadership in Research Teams Award”. Fundación Figeva
- Matxalen Llosa: Elected President of the Board of Directors of the Eunice European University

7

Outreach Activities



In recent years, IBBTEC has made a great effort to publicize and communicate its activities to society. We have a Scientific Communication and Dissemination Unit, who acts in coordination with the communication departments of UC and CSIC. IBBTEC has carried out multiple dissemination activities, bringing its research closer to citizens. Some of these are:

-European Researchers' Night: organization of scientific workshops designed for groups of different ages. A public stand was set up in a city square, where IBBTEC scientists explained their projects.

-Science Week: visits of secondary education students to IBBTEC facilities.

-Science Fair: IBBTEC staff participate in evaluation of experimental projects presented by secondary education students from various centers.

-Conference cycles: IBBTEC researchers participate in: "Scientific Coffee", "Science Saturdays", and "Biotechnology for all" series, all organized by the UC, as well as in the international initiative "Pint of Science".

-International Day of Women and Girls in Science: IBBTEC staff has participated in different programs, with the publication and dissemination of videos, and in informative talks at educational centers

-Social networks: IBBTEC deploys intense activity on social networks, especially Twitter @IBBTEC. Many groups also maintain a significant presence on this network. IBBTEC is also present on Instagram or LinkedIn, in an account maintained by OpenLab.

Coordinator: Félix J. Sangari

8

Training



One of IBBTEC main assets is that a broad proportion of its faculty belong to the University of Cantabria (UC) staff. As such they are deeply involved in tuition included in the bachelor, master and doctorate programs offered by this institution.

UC PROGRAMS

Most of IBBTEC faculty participates in undergraduate tuition at UC School of Medicine, included in the Biomedicine, Medicine and Nursing degrees.

IBBTEC participates in Master tuition, particularly in the Inter-University (UC-UPV/EHU) Molecular Biology and Biomedicine Master Program, successfully ongoing since 2007. Likewise, some of IBBTEC staff also teach in Inter-University Mental Health; New Materials; and Data Science Master Programs.

IBBTEC faculty actively participates in the Molecular Biology and Biomedicine Doctorate Program, included in the UC Doctorate School (EDUC). It is noteworthy that the Coordinators of such program have always belonged to IBBTEC staff.

Direction of final projects

Direction of degree final projects (Trabajos Fin De Grado, TFG):

- University of Cantabria (Medicine and Nursing): 22 TFG
- Other Universities: 5 TFG:

Direction of Master final projects (Trabajos Fin de Máster, TFM):

- Molecular Biology and Biomedicine Master Program: 16 TFM
- Inter-University Mental Health program: 3 TFM
- Other Universities: 3 TFM

Graduate students carrying out their experimental work in IBBTEC's laboratories are mainly supported by the national training programs (FPI, FPU) and the UC predoctoral fellowship program; and to a lesser extent by other institutions like AECC and by contracts linked to research projects. They undertake their doctoral training under the premises of the UC Molecular Biology and Biomedicine Doctorate Program, sponsored by the UC Doctorate School (EDUC). An Evaluation Panel, made up of two independent researchers, is assigned to each student in order to appraise progress. Students participate in weekly gatherings and attend national and international meetings. They are encouraged to spend a three-month period in a foreign laboratory in order to attain the "International Commendation" for their doctorate degree.

2021

- *Biofilms promovidos por plásmidos conjugativos y su inhibición.* Carolina Palencia Gándara. Supervisor: Fernando de la Cruz. 26/3/21 (International Commendation)
- *Cannabidiol como antidepresivo de acción rápida: identificación de los mecanismos moleculares implicados en su efecto antidepresivo.* Eva Ariadna Florensa Zanut. Supervisors: Álvaro Díaz, Fuencisla Pilar. 13/4/21 (International Commendation)
- *Análisis descriptivo y funcional de las colonias microbianas visible que crecen en la cueva de Altamira, enfocado al diseño de medidas de control.* Candela González-Riancho Fernández. Supervisor: Juan María García Lobo. 20/4/21
- *Relaxasas conjugativas como vehículos de la translocación de proteínas y ADN a través de sistemas de secreción tipo IV: implicaciones biológicas y biotecnológicas.* Dolores Lucía Guzmán Herrador. Supervisor: Matxalen Llosa. 21/4/21 (International Commendation)
- *Dimerización de ERK como determinante de factores de progresión tumoral.* Dalia de la Fuente Vivas. Supervisors: Berta Casar, Piero Crespo. 14/12/21 (International Commendation)

2022

- *Edición genómica en ratón basada en la electroporación de CRISPR/Cas9 en cigotos. Aplicación al estudio del síndrome de mano hendida.* Sara Lucas Toca. Supervisors: Endika Haro, Marian Ros. 2/9/22
- *Caracterización genética y funcional de la heterogeneidad intratumoral en un modelo murino de cáncer de páncreas.* Laura Quevedo Palacio. Supervisor: Ignacio Varela. 27/7/22 (International Commendation)
- *Análisis de complejos proteína-ADN conjugativos por tecnología de nanoporos.* Fernando Valenzuela Gómez. Supervisors: Elena Cabezón, Iñaki Arechaga. 29/6/22 (International Commendation)
- *Papel de las proteínas scaffold IQGAP en la progresión tumoral y la metástasis del melanoma.* Rocío García Gómez. Supervisors: Berta Casar, Piero Crespo. 17/6/22 (International Commendation)
- *Nuevo papel de ERK en la regulación transcripcional de MYC.* Marta Morante Ezquerro. Supervisors: Lorena Agudo, Piero Crespo. 27/5/22
- *Estudio de la fibrosis patológica miocárdica mediante nanomateriales dirigidos por proteínas como herramienta teragnostica y sistema de expresión génica dirigida.* David Maestro Lavín. Supervisor: Ana V. Villar. 25/2/22 (International Commendation)

8.2

DOCTORAL THESES

8.3

OTHER ACTIVITIES

SUMMER INTERNSHIPS

IBBTEC supports short summer internships for selected students in their final year of their undergraduate or master's courses. In 2021-2022, five students were selected based on their academic record and spent two months working at the laboratories of the IBBTEC groups of their choice.

OTHER TRAINING ACTIVITIES

- JAE INTRO CSIC program
- ERASMUS program
- Carolina Foundation Scholarships
- Ciclos Formativos FP



9

Knowledge Transfer. Openlab



OPENLAB

IBBTEC is a highquality research institution, which is committed to knowledge transfer as one of its main objectives. To this end, from its inception, the founding partners opted for the strategic development of technology transfer activities. This resulted in the creation of a specific program, OpenLAB, provided with facilities specifically devoted to identifying, supporting, and hosting technology transfer and biotechnology-based startup projects. Hitherto, it has hosted three companies. Thanks to this commitment, in recent years there has been an increase in the Institute's collaborations with private companies, resulting in a greater visibility of the science generated at IBBTEC. In this line, we want to continue deepening in the design and implementation of strategies and specific plans for incubation and tech transfer, allowing the development of these activities and the exploitation of their full potential.

Tech transfer & entrepreneurship Support Activities

One of the main objectives of the OPENLAB program is the identification of tech transfer projects in the field of biotechnology and biomedicine, and their sub-

sequent development and maturation through incubation, support and monitoring actions, which make up a business promotion and assistance program. During the 2021-22 period, different initiatives have been launched:

a) OPENLAB-INNOVA Call

IBBTEC launched annually its OPENLAB-INNOVA program, a call with 3 main objectives:

- Promotion and development of collaborative innovative projects, fostering the interaction of companies with the Institute's research groups
- Allow access for external companies to IBBTEC cutting-edge scientific and technical services and facilities.
- Promotion and support of scientific-based entrepreneurship, offering lab space in IBBTEC's bio-incubator and providing training and support programs for entrepreneurs.

During 2021-22, several projects have been evaluated, and one of them has been enrolled in this program.

b) CEO Program

In May 2021, we launched the OPENLAB-CEO Program (OpenLAB Strategic Consulting), aimed at supporting projects undertaken by IBBTEC scientific groups that have yielded research results with market potential. The program offers external professional consultancy that adds value and facilitates the design of their transfer strategy, in the following areas: Market Studies, Patent Freedom-to-Operate Studies (FTO), design of Business Model, Technical and Commercial Feasibility, Regulatory Studies, etc. During 2021-22, four groups have been enrolled in this program.

c) OpenLAB Consultancy

Based on the OpenLAB's tech transfer Know-How, we offer consultancy, advisory, specialized infrastructure and project management services for external companies and entrepreneurs, and a link to other support resources. Our portfolio of services includes:

- Support projects in areas related to knowledge transfer (generation, identification, protection, valorization and commercialization of knowledge, entrepreneurship).
- Training projects related to knowledge transfer.

- Coordination, development and management of knowledge transfer projects, from the identification of market needs to their commercialization.

During the 2021-22 period, more than 10 projects have been sponsored.

d) Prospection of new projects and collaborations

We have carried out a prospection of possible strategic alliances with regional institutions that have programs in the field of entrepreneurship, such as CEOE-CEPYME Cantabria; the Cantabria Chamber of Commerce; and CISE, to develop joint projects. To facilitate, the prospecting, negotiation and implementation of a Public-Private collaboration R&D project between an IBBTEC research group and a multinational company.

Coordinator: Luis Miguel Lozano Gordillo



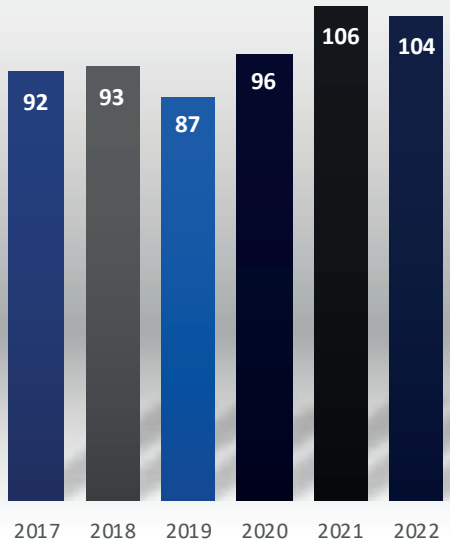




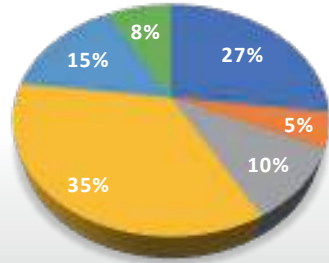
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The center in numbers

Total staff

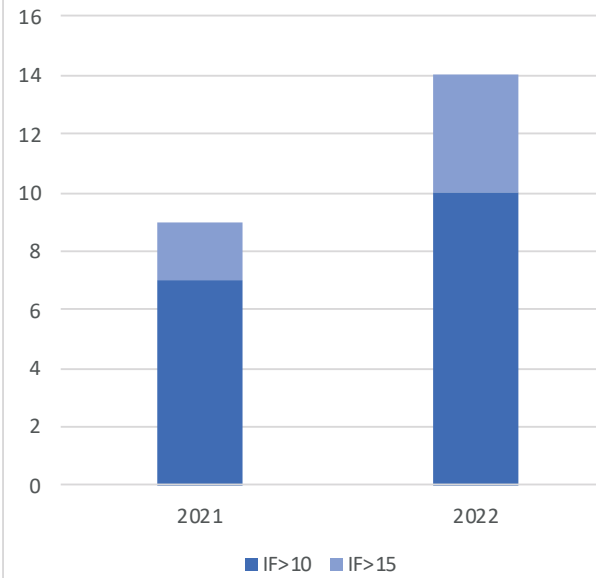


Personnel breakdown in 2022



- Permanent researchers
- RyC, BG, MZ, MS researchers
- Postdoctoral researchers
- Predoctoral researchers
- Technicians
- Management and administrative

Publications 2021-2022



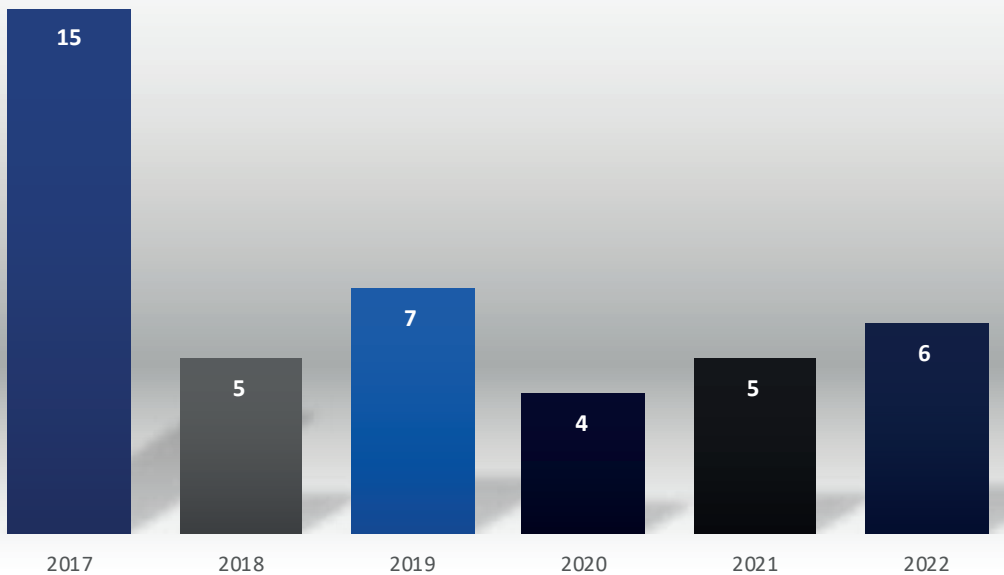
Total number of articles: 84

IF > 10 = 27%

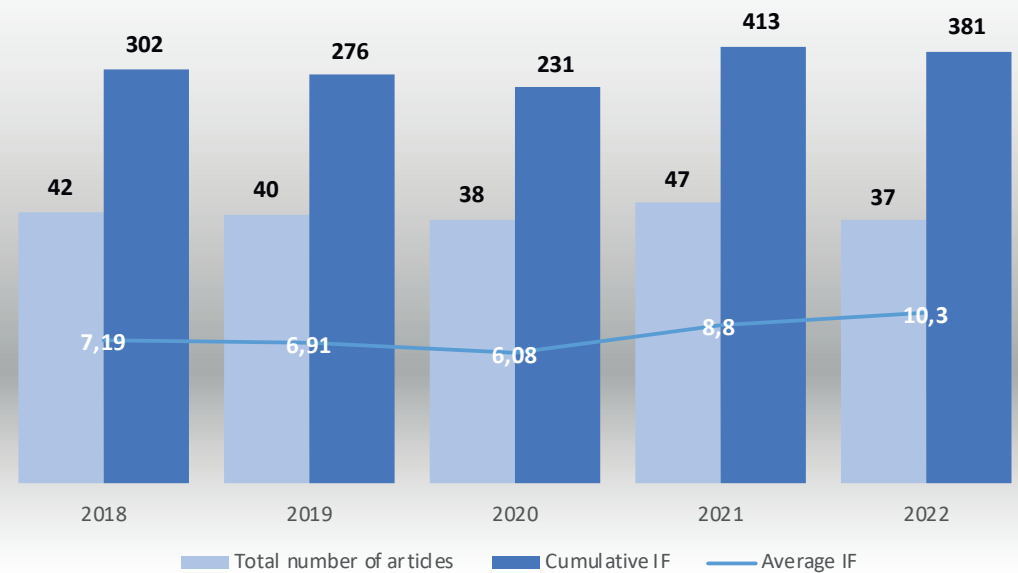
Cumulative IF: 794

Average IF: 9,5

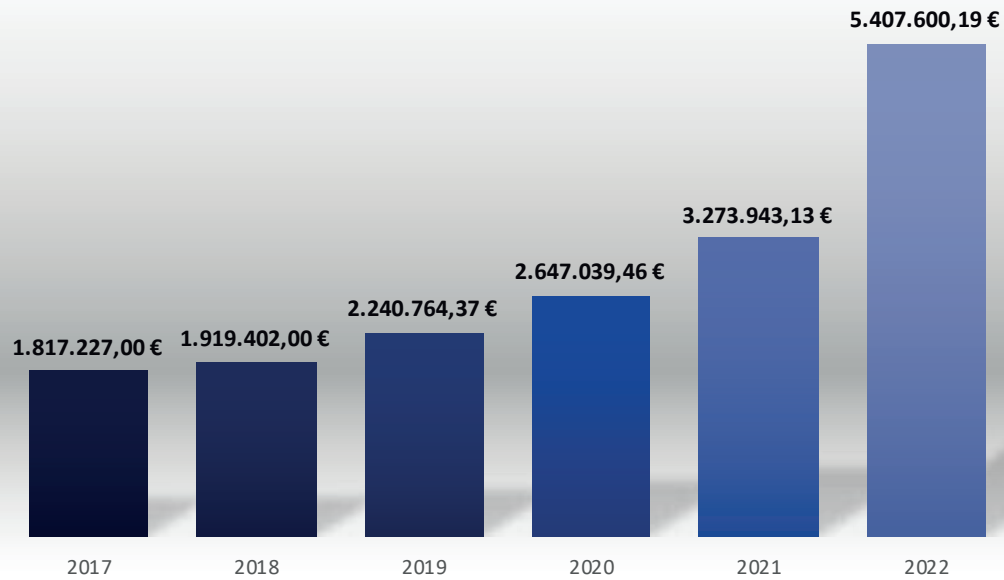
Theses defended during 2017-2022



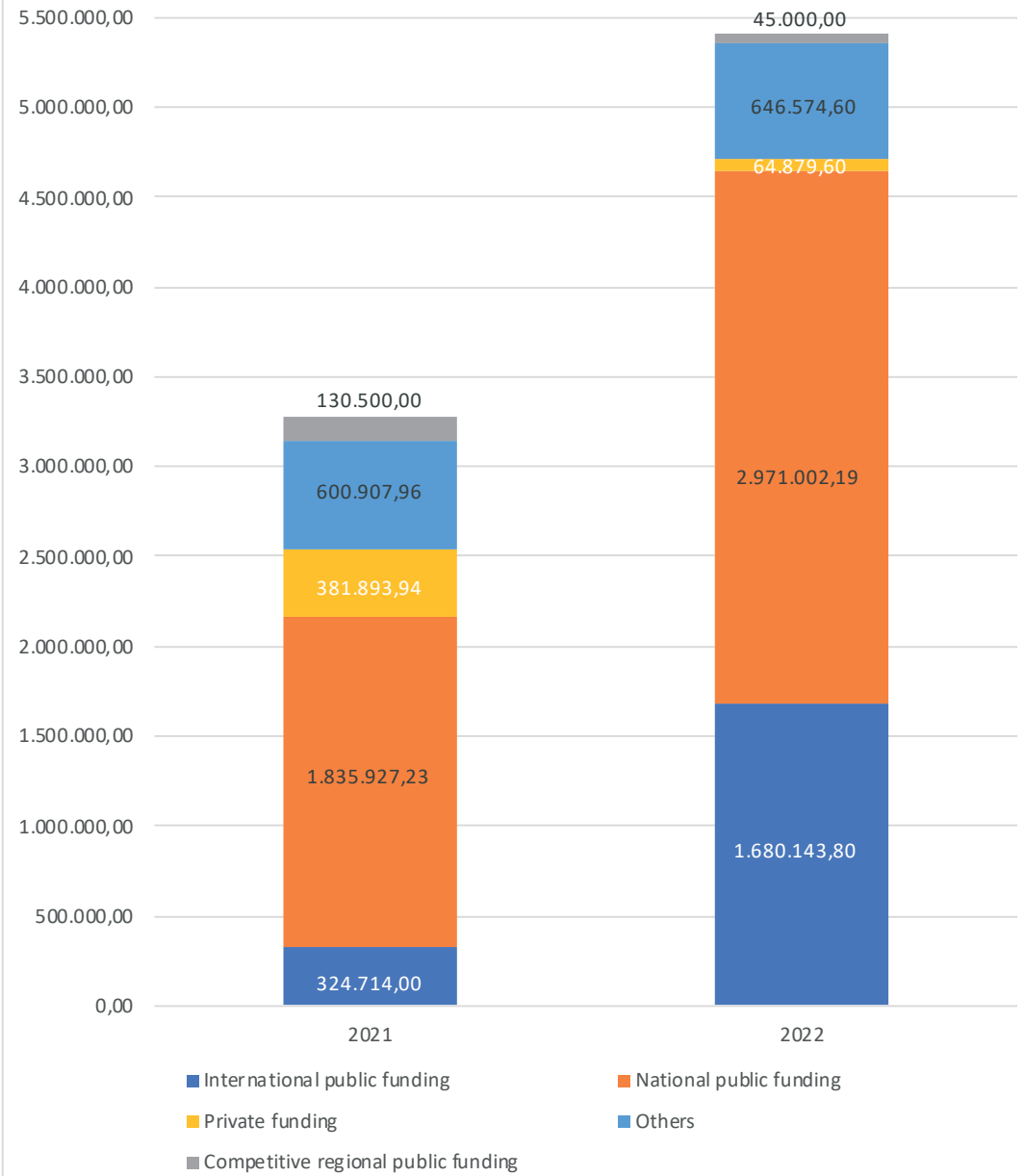
Evolution of scientific articles 2018-2022



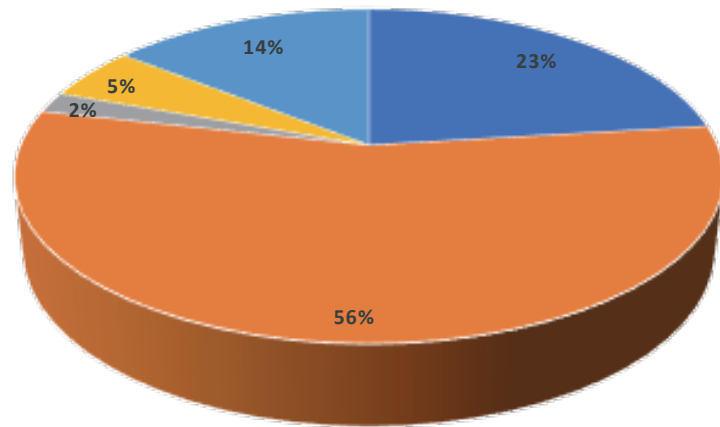
Funding evolution during 2017-2022



Income (Euro) 2021-2022



Funding sources 2021-2022



- International public
- National public
- Competitive regional public
- Private
- Other public funding



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