ANNUAL REPORT 2025

Centre for Innovative Biomedicine and Biotechnology

CENTRE FOR INNOVATIVE BIOMEDICINE AND BIOTECHNOLOGY

CiBB ANNUAL REPORT 2025

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ABOUT CiBB

Overview

CiBB — Center for Innovative Biomedicine and Biotechnology is a leading Research & Innovation Unit at the University of Coimbra, dedicated to advancing biomedical and biotechnology sciences. CiBB brings together four research institutions: CNC-UC — Center for Neuroscience and Cell Biology, iCBR-FMUC — Coimbra Institute for Clinical and Biomedical Research, MIA-Portugal — Multidisciplinary Institute of Ageing, and GeneT — Gene Therapy Center of Excellence.

As the flagship biomedical and biotechnology research unit of the University of Coimbra, CiBB is the largest R&I unit in central Portugal, comprising approximately 700 members. It is also the only Associate Laboratory coordinated by the University of Coimbra, and achieved the highest possible rating in the latest evaluations by the Foundation for Science and Technology (FCT). Under the 2023/2024 Multiannual Funding Program, CiBB received more than 10M € in funding for the 2025-2029 period. This recognition highlights the center's outstanding scientific achievements between 2018 and 2023, as well as the strength and ambition of its strategic plan for the coming years. With this new round of funding and recognition, CiBB reinforces its role as a leading force in biomedical research and innovation, both nationally and internationally.

CiBB is linked to the Faculties of Pharmacy, Medicine, Sciences and Technology, Sport Sciences and Physical Education, and Economics, as well as to the Institute of Interdisciplinary Research and to the Coimbra Local Health Unit. CiBB comprises 39 dynamic and multidisciplinary research groups, dedicated to understanding how and why diseases develop and translating this understanding into clinical applications and technological breakthroughs. The Center has a high-level of scientific production and attracts talent and funding at both national and international levels.

Structured around four research areas, CIBB's mission spans diverse interdisciplinary research topics:

- Neuroscience and Disease
- Metabolism, Ageing and Disease
- Innovative Therapies
- Healthcare Challenges

CiBB is committed to nurturing talent, through robust international training programs at the master's and doctoral levels. Additionally, CiBB bridges the gap between research and society through effective communication and public engagement initiatives.

In collaboration with the Coimbra Local Health Unit and its Clinical Academic Center, CiBB leverages its strong ties to clinical practice, facilitating the translation of fundamental research findings into clinical benefits. Moreover, CiBB invests in the transformation of scientific breakthroughs into intellectual property, fostering technology transfer and the creation of economic value. Capitalizing on its strategic location within Biocant Park (Cantanhede), the first and largest biotechnology hub in Portugal, and its partnerships with biotechnology companies, CiBB fosters innovation and entrepreneurship.

STRUCTURE

CiBB

Governance

Executive Committee | External Advisory Board | Scientific Council

Promoters

- CNC-UC
- iCBR-FMUC
- MIA-Portugal
- GeneT

Research areas

- Neuroscience & Disease
- Metabolism, Aging & Disease
- Innovative Therapies
- Healthcare Challenges

Support Units

Scientific Platforms

Animal Facility
Bioinformatics and Data Analytics
Flow Cytometry
Genoinseq
High-Throughput/High-Content Screening Platform
Life Sciences Mass Spectometry Laboratory
Mitochondrial Biomedicine and Theranostics Laboratory
Microscopy Platform
MitoXT
Neurochemistry Laboratory
Neurogenetics Laboratory
ViraVector

R&I Support

Advanced Studies & Career Development
Green Labs
Research Funding & Management
Open Science
Science Communication
Technology Transfer

GOVERNANCE

Coordinator

Luís Pereira de Almeida
CiBB Coordinator
CNC-UC President
GeneT Coordinator

External Advisory Board

John Greenwood
Chair University College London (UCL),
United Kingdom

Inna Slutsky
Sackler School of Medicine,
Tel Aviv University, Israel

Kendall Wallace
University of Minnesota, USA

Matthijs Verhage
Vrije Universiteit (VU), Amsterdam,
Netherlands

Thomas von Zglinicki
University of Newcastle, United Kingdom

Scientific Council

The Scientific Council, with consulting functions, is composed of the Executive Committee, all Group Leaders, and elected representatives from Researchers, PhD Students, Postdocs, and Technicians

Executive Committee

Ana Luísa Carvalho
Neuroscience & Disease Area
Coordinator, CNC-UC

Paulo Oliveira
Metabolism, Aging & Disease
Area Coordinator, CNC-UC

Lino Ferreira
Innovative Therapies Area
Coordinator, CNC-UC

Bárbara Gomes
Healthcare Challenges Area
Coordinator, iCBR-FMUC

Henrique Girão
iCBR-FMUC Director

Manuel Santos
MIA-Portugal Scientific Director

PROMOTERS

CNC-UC

The Center for Neuroscience and Cell Biology (CNC-UC) is a research institute founded in 1990, which fosters biomedical research and multidisciplinary graduate training at the University of Coimbra. CNC-UC was the first established Associate Laboratory ("Laboratório Associado") in Portugal, and it has steadily increased its scope of scientific competences over the years, with a strong expertise in neuroscience, metabolism and aging, as well as in the study of neurodegenerative, neuropsychiatric, cardiovascular and liver disorders. Its research aims to both identify disease mechanisms and develop innovative therapeutic strategies.

CNC-UC has developed strong fundamental research that can be translated to clinical and biotechnology applications. Close collaboration between basic researchers and the clinical faculty enables translation of basic knowledge into clinical practice, enhanced by strategic partnerships with the pharmaceutical industry. CNC-UC promotes technology transfer and the creation of biomedical and biotechnology enterprises, facilitated by its role as founding partner of the Biocant — Biotechnology Innovation Center.

In parallel to developing high quality and impactful fundamental and applied research, CNC-UC is engaged in training the next generation of biomedical researchers, and in disseminating scientific information to the community.

www.cnc.uc.pt

iCBR-FMUC

Coimbra Institute for Clinical and Biomedical Research (iCBR-FMUC) is a research Institution of the Faculty of Medicine — University of Coimbra and relies on excellent clinical and laboratory facilities as well as on a highly skilled and multidisciplinary scientific staff. iCBR-FMUC is an internationally recognized centre of excellence for research in health sciences. Particular strengths include research in Vision Sciences.

iCBR-FMUC fosters an environment for research, education and training that promotes a multi-disciplinary approach to health sciences, crossing traditional boundaries between Medicine, Biology and Engineering. Integration between basic and clinical research is essential for the advance of modern health sciences and iCBR-FMUC commits a major effort to support such integrated research programs.

www.uc.pt/fmuc/icbr/

MIA-Portugal

The Multidisciplinary Institute of Ageing (MIA-Portugal) is the first institute in Southern Europe focused on the study of aging biology, whose mission is to understand the genetic, molecular, cellular, environmental, and physiological bases of aging. Founded in 2020 through a European Teaming for Excellence project, from the Horizon 2020 program (EC), it involves the University of Coimbra, the Commission for Coordination and Regional Development of the Center of Portugal (CCDRC), the Pedro Nunes Institute (IPN), the University of Newcastle, and the University Medical Center Groningen.

MIA-Portugal is an institute open to international interactions and partnerships in the field of ageing biology, contributing to the global mission of producing new knowledge, developing new technologies, and new therapies that reduce or eliminate the burden of disease during ageing.

Under the motto “Pioneering Healthier Tomorrows”, MIA-Portugal’s development strategy is based on the interconnection of fundamental biomedical research and research in populational and clinical contexts, leveraging predictive, preventive, participatory, and precision medicine programs for healthy living.

Attracting and retaining highly qualified talent and providing advanced training for young researchers are integral to MIA-Portugal’s main mission. The establishment in 2026 of its research activities in a modern biomedical research building, within the sophisticated ecosystem of the Health Campus of the University of Coimbra, will create unique working conditions to produce new knowledge, services, and products for quality of life.

www.uc.pt/mia/

GeneT

Gene Therapy holds great promise for revolutionising modern medicine. It represents a paradigm shift in approaching disease treatment, as it addresses the root causes of diseases instead of focusing on treating their symptoms. With unparalleled potential for both cure and economic impact, this groundbreaking medical biotechnology demands cutting-edge research and innovation to address the thousands of severe human diseases.

With this in mind, the EU-funded GeneT project will establish a unique gene therapy research and innovation hub rooted in a Center of Excellence (CoE) located in central Portugal. Anchored at the University of Coimbra, GeneT unites scientific excellence with international cooperation to pioneer new gene therapy solutions capable of alleviating suffering and fostering economic growth.

This CoE will capitalize on the already existing RD&I capacity in the field at the University of Coimbra (UC) — the regional (and national) pivot of the innovation potential and knowledge transfer in Red Biotechnology — and act as an (inter)national enabler of scientific and business excellence in Gene Therapy innovation and manufacturing.

Gene Therapy is the latest revolution in the treatment of severe human diseases with the highest curative and economic potential in the health sector. Extraordinary results have already been achieved in the treatment of a few neurological, ophthalmic, hepatic, oncological and hematological disorders with outstanding clinical and economic impacts. UC, notably its Center for Neuroscience and Cell Biology, has proven scientific excellence in specific areas of the field, and a matchless ecosystem to strive in this high added-value sector, which encompasses the Coimbra Local Health Unit and Biocant — Biotechnology Innovation Center, recognized as the epicenter of the biotech industry in Portugal.

www.uc.pt/genet/

NEUROSCIENCE & DISEASE

Coordinator
Ana Luísa Carvalho

Groups
14

Understanding brain function at the molecular, cellular, circuits and behavioral levels, while also tackling the complexities of neurological, neurodegenerative, psychiatric and vision disorders.

METABOLISM, AGING & DISEASE

Coordinator
Paulo Oliveira

Groups
8

Unraveling the metabolic landscapes of chronic diseases, with emphasis on those that are environment or aging-related, in an integrative and interdisciplinary approach from *in vitro* to animal models, human samples, and patients.

INNOVATIVE THERAPIES

Coordinator
Lino Ferreira

Groups
13

Promoting interdisciplinary research that can be translated into the development of innovative tools and approaches for prevention and treatment of a selected group of disorders that are exacerbated in the aged population, such as neurodegenerative, ischemic, infectious and cancer diseases.

HEALTHCARE CHALENGES

Coordinator
Bárbara Gomes

Groups
4

Triggering action on some of the most complex health issues of today. Improving health and well-being for all, UN's third Sustainable Development Goal, requires a visionary approach to tackle major challenges for healthcare globally.

2025 AT A GLANCE

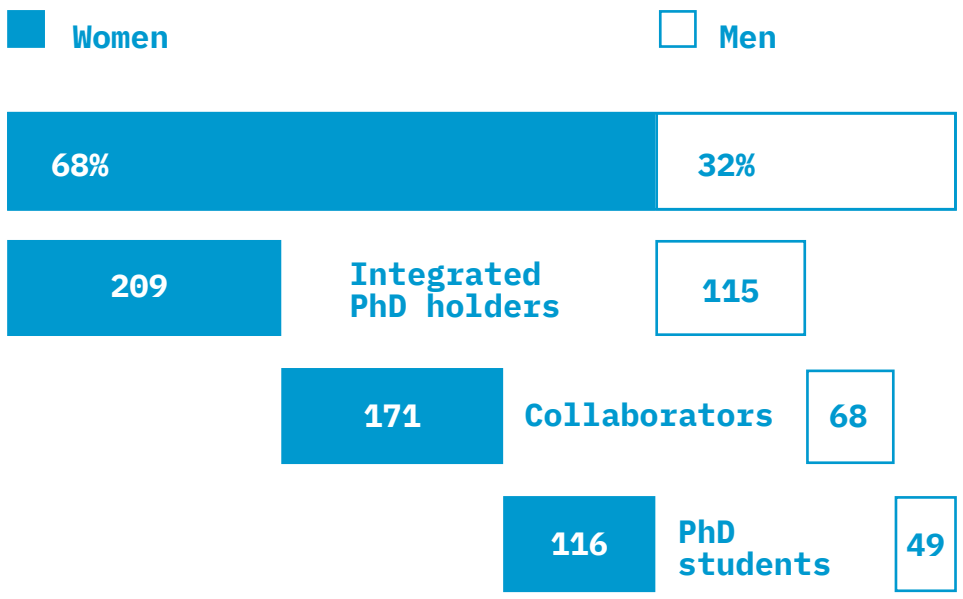
Locations

- UC-Polo I
- UC-Polo III
- UC-Biotech

Publications

- > 650 Publications
- 80% Open access
- > 77% Q1

728 Members



Training

- 10 PhD Programs
- 9 MSc Programs
- 1 EU MSCA Doctoral Network

TechTransfer

- 32 Active IP families
- 15 Granted IP
- 9 Active spin offs

Funding

- > 50M €
- ~ 39M € R&I Proj
- ~ 11M € UID (FCT)

140 Projects initiated and/or awarded

Scicomm

Public Engagement in Science

> 12.5 k People
> 400 Researchers

Media

> 690 News
> 12.5M Audiences

There Is No Science Without Enthusiasm

As a child, I loved imagining and trying new things. I think that enthusiasm has never changed, and it is a very important characteristic in all human activities—especially in science, because it allows us to overcome difficulties. If you are not an enthusiast, science can become a burdensome activity, when in fact it is a highly stimulating one that brings the great pleasure of discovery.

“That pleasure children experience is something I believe should remain alive, both in everyday life and in scientific activity”

When I was young, I experimented with many things in many different areas. I liked making a telephone between my bedroom and my brother’s room, stretching wires and building a Morse-code telephone. I enjoyed planting seeds and watching plants germinate. I loved trying and experimenting with all kinds of things, not all of them particularly safe; and I did all of it as a child, just as most children do. One of the things I still enjoy most today is planning a project—whether an experiment or something else—launching it and then observing the results.

I believe it is essential to preserve optimism, creativity, and enthusiasm. Scientific activity depends greatly on these qualities as well. Therefore, I believe we must provide good conditions—and find ways to provide good conditions—for our researchers so that they can achieve their highest potential. We have succeeded in attracting extraordinarily talented and hardworking people who have been highly effective in producing world-class science.

Over these seven years of the CiBB, it has been remarkable to see that our scientists now enjoy both national and international recognition; that we have experienced a very significant increase in our size and scientific output; that we have achieved a dramatic increase in securing funding, particularly international funding; and that in the most recent evaluation we received the rating of “Excellent” from the Foundation for Science and Technology.

This is the result of the individual and collective efforts of all our researchers, as well as of a structure capable of creating the conditions for professional scientific production. All of this has also been achieved despite well-known systemic challenges: limited national funding, administrative complexity, and the structural constraints that are common to public institutions across Portugal.

At the end of the nineteenth century, under the influence of the Marquês de Pombal, the University of Coimbra underwent a major reorganization in accordance with the Enlightenment. However, this evolution later stalled, deprived of the kind of development that took place in countries such as Germany, where the Humboldtian model was established, making scientific activity—rather than teaching—the university’s primary mission.

Portuguese universities are on a path of transformation, progressively repositioning scientific production as a central pillar of their mission — a shift that is both necessary and encouraging to witness.

The development of science in Portugal over the last fifty years has been extraordinary, and the entire Portuguese scientific community deserves congratulations. Critical to this progress was the contribution of two leading figures at the origins of the CNC-UC and the iCBR-FMUC, the oldest institutes within the CiBB: Professor Arsélio Pato de Carvalho and Professor José Cunha-Vaz, as well as all the people who worked alongside them and played important roles, such as Professor Catarina Resende de Oliveira and the teams they succeeded in bringing together. The creation of the CiBB builds on that initiative, with the vision of joining forces to create a major biomedical center in Coimbra.

“Given its scale, CiBB and the University of Coimbra should establish an organic unit, similar to a faculty, reflecting biomedical research’s central role in the university’s identity and future”

CiBB has the conditions necessary to develop further as a major biomedical research center at both the national and global levels and to play a decisive role in strengthening scientific production in several areas—including synapses, aging mechanisms, gene therapy, nanomedicine, and brain disorders. In all of these fields, we can provide leadership and make a highly relevant contribution with global impact.

The construction of the Biomed and GeneT buildings will be fundamental to maintaining this attractiveness. The central region of Portugal, and particularly the area around Coimbra, has enormous potential and an exceptional ecosystem. We have the conditions not only to produce excellent science, but also to translate it very efficiently into both clinical practice and economic activity. **We can transform central Portugal into a global force in biomedicine and biotechnology.**

Looking ahead, it is important that society values science and knowledge—and in these turbulent times, it is not always clear that this is happening. However, Portugal is one of the European countries where the population places the greatest trust in science. It is essential to foster a culture that values knowledge, where opinions are based on that knowledge and on data that can be verified. Without this, science cannot develop.

NEUROSCIENCE & DISEASE

Understanding brain function at the molecular, cellular, circuits and behavioral levels, while also tackling the complexities of neurological, neurodegenerative, psychiatric and vision disorders.

Coordinator

Ana Luísa Carvalho

Group Leader

Ira Milosevic
Maria Isabel Santana

Alessio Vagnoni
Sandra Morais Cardoso
Luís Ribeiro
Ana Cristina Rego
Cristina Márquez
Cláudia Cavadas
Rodrigo Cunha
João Peça
Carlos B. Duarte
João Laranjinha
Ana Luísa Carvalho
Francisco Ambrósio

Group

Ageing Brain
Biomarkers in Neuropsychiatric Disorders: from Molecules to Diagnosis and Intervention
FlyCab: Cell Biology of Neuronal Ageing
Gut-Brain Axis
MemBRAIN: neuronal surface biology
Mitochondria and Neurodegenerative Disorders
Neural Circuits of Social Behavior
Neuroendocrinology and Aging
Neuromodulation
Neuronal Circuits and Behavior
Neuronal Signaling
Redox Biology and Brain Sensing
Synapse Biology
Vision Diseases

A Future of Hypotheses Shaped by Technology

Over the coming years, in addition to consolidating our core strengths in molecular and cellular neuroscience, as well as in the mechanisms of brain and vision diseases, there will be a need to strengthen systems and computational neuroscience at CiBB. It will also be essential to fully develop the translational potential of our research by strengthening ties with clinical practice.

“A key challenge will be to connect different levels of knowledge within neuroscience and to encourage collaboration with other disciplines”

Within CiBB’s Neuroscience and Disease area, some of the most innovative studies conducted in 2025 focused on understanding the mechanisms underlying disorders of the nervous system. **These efforts include not only the development of new models but also their application to characterizing pathogenic mechanisms underlying neurodegenerative, neuropsychiatric and vision disorders.**

One study examined circadian rhythms in a genetic animal model of Machado-Joseph disease and their disruption in both animal models and patients. Another identified for the first time psychiatric alterations associated with Fragile X-Associated Tremor/Ataxia Syndrome. A third study used an animal model of chronic stress to investigate the disruption of synaptic function.

At the same time, advances in application depend on knowledge generated through fundamental research. In this regard, I would highlight the importance of two studies. One investigated NMDA receptors and the role of BDNF in brain plasticity and in regulating hyperexcitability in epilepsy. The other, in the field of aging, sought to understand the mechanisms controlling genome stability, with implications for aging research, particularly in relation to the brain.

These studies exemplify curiosity-driven discoveries that can be translated into applied research. That is the essential role of fundamental research in neuroscience: to deepen our understanding of the brain and generate the knowledge upon which future applications are built.

Neuroscience has evolved enormously in the past two to three decades. Systems neuroscience has seen remarkable progress, largely driven by technological developments, which have enabled the use of methodologies capable of analyzing neuronal activity in living animals with high spatial and temporal resolution, as well as manipulating neuronal activity.

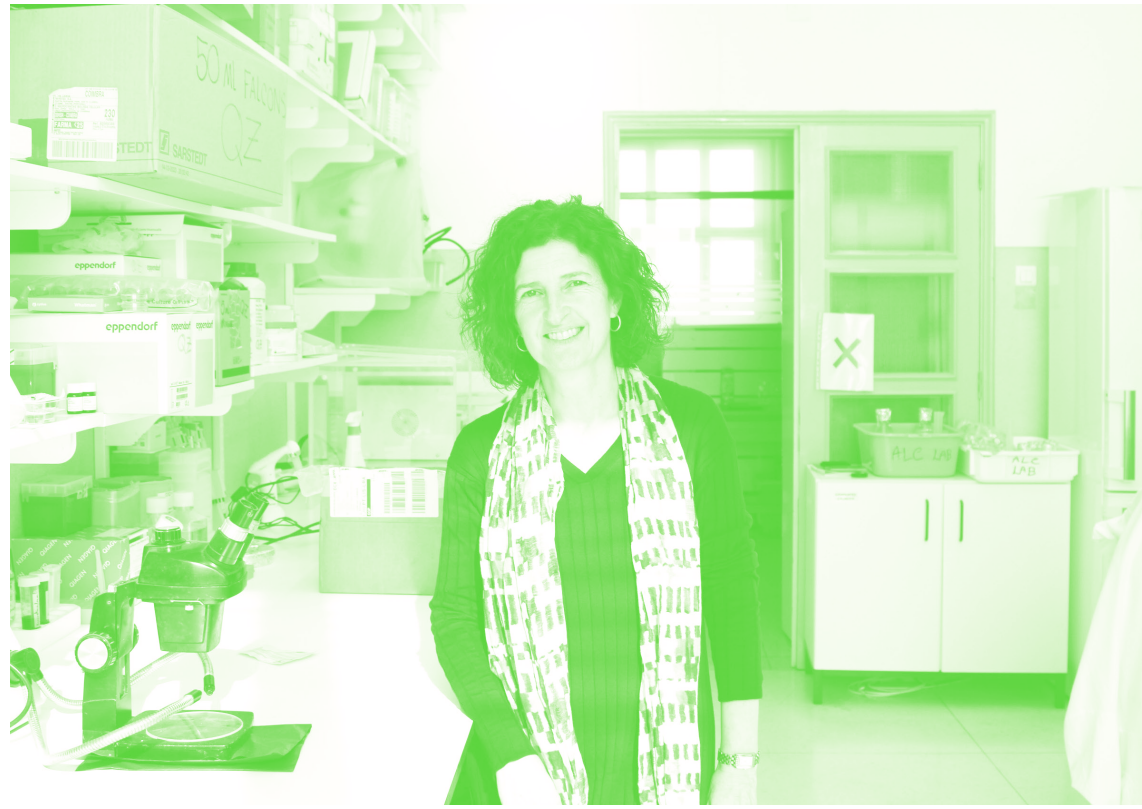
Computational neuroscience has also contributed to the advancement of the field. Computational approaches allow researchers to build models that leverage the enormous volumes of data available today, a lot of which is openly accessible to the entire scientific community. These resources are already proving invaluable for accelerating discovery.

Extracting meaningful insights from large datasets requires computational training that many neuroscientists have not traditionally acquired. **Computational mining and integration of data is transformative, both in the analysis of datasets and clinical information, but also in the generation of new testable hypotheses. In the future, and already today, hypothesis generation will depend heavily on large-scale data analysis, and this approach should become an integral part of how we conduct research.**

To achieve this, students must receive very strong conceptual and experimental training in neuroscience while also developing computational skills. This vision motivated the recent creation of the idpIN — International Doctoral Program in Integrative Neuroscience, based on the idea that future science will require scientists who are broadly prepared, capable of maintaining a global perspective on complex problems, whether in neuroscience or other fields.

“Science will always need people with strong critical thinking skills, able to identify and address the most important questions”

Another challenge at this point is to connect different levels of knowledge within neuroscience and to encourage collaboration between neuroscience and other disciplines. In the future, we will begin to see the benefits of open science, which is becoming a reality, and scientists will increasingly need to adopt collaborative attitudes and build multidisciplinary teams. We are gradually moving toward this more synergistic way of working. Creating opportunities for people to meet and discuss science has become one of my priorities.



At the same time, many questions are emerging from the discoveries being made and from the growing understanding we are developing about how the brain functions and how brain diseases develop. These discoveries raise profound ethical questions that are not yet being adequately addressed.

I believe that experimental scientists and quantitative researchers will increasingly feel the need to engage in dialogue with philosophers and sociologists to interpret the broader implications of scientific findings. The time is coming when philosophers and sociologists will help more quantitative scientists make sense of what they are discovering.

AGEING BRAIN

Overview

6 Members
2 PhD holders
3 PhD students
1 Other staff

250k € Funding

As we age, our nervous system and brain undergo natural, and sometimes pathological, changes. The Ageing Brain research group studies the changes in neuronal and synaptic morphology and functions with aging. More specifically, the group aims to understand molecular and cellular processes at the neuronal synapse that deteriorate with age, and lead to increased disease susceptibility. To tackle these questions, the group uses murine and human cellular model systems, and employs electrophysiology and advanced imaging.

Publication highlights

EMBO Reports. 2025.
DOI: 10.1038/s44319-025-00613-3

Nature Neuroscience. 2025.
DOI: 10.1038/s41593-025-02002-4

Aging Clinical and Experimental Research. 2025.
DOI: 10.1007/s40520-025-03034-3

Group leader

Ira Milosevic

Research lines

Membrane trafficking

Ageing mammalian brain

Neuronal cell biology

Neurodegenerative diseases

Electrophysiology

BIOMARKERS IN NEUROPSYCHIATRIC DISORDERS: FROM MOLECULES TO DIAGNOSIS & INTERVENTION

Overview

30 Members
13 PhD holders
17 PhD students

> 1.2M € Funding

Neuropsychiatric disorders have a huge impact at both individual and societal levels, posing a tremendous amount of psychological, financial, academic and social burden, which reinforces the importance of early diagnosis and intervention. The main goal of the Biomarkers in Neuropsychiatric Disorders group is the identification of new biomarkers, focused on neuropsychiatric disorders, leading to the design of patient-tailored preventive and therapeutic interventions, promoting the translation of fundamental research into clinical practice. The research developed in the group relies on collaborative efforts between fundamental researchers and clinicians for access to human biological samples and clinical data. The team is integrated in international consortia that define standard methodologies and allow for big-data studies and clinical trials.

Publication highlights

Neurobiology of Disease. 2025. DOI: 10.1016/j.nbd.2025.106897

Journal of Alzheimer's Disease. 2025. DOI: 10.1177/13872877251331096

JAMA Psychiatry. 2025. DOI: 10.1001/jamapsychiatry.2024.4305

Neuropharmacology. 2025. DOI: 10.1016/j.neuropharm.2025.110623

Journal of Neuro Oncology. 2025. DOI:10.1093/neuonc/noae169

As a leading reference in neurodegenerative disorders in Portugal, this research group has focused on identifying early cognitive, imaging and fluid biomarkers with potential application in clinical settings. The group contributed to the standardization of the most used screening cognitive tools, memory tests and behavioral scales; the development of advanced imaging biomarkers (3tesla MRI, PET imaging) for dementia, Multiple Sclerosis (MS), Stroke and Delirium; validate CSF biomarkers for Alzheimer´s disease (AD), Fronto-Temporal Dementia (FTD), Prion diseases and MS, extended more recently to blood biomarkers using both automated and Single Molecule Array (SiMoA) approaches, pioneer in our country and available to large cohorts.

Group leader
Maria Isabel Santana

Overall, the work of the Biomarkers in Neuropsychiatric Disorders group has contributed to a change in the diagnostic and prognostic paradigm of neurodegenerative diseases in Portugal, moving from a strictly clinical perspective towards a biological approach. It has also been involved in dissecting brain alterations in animal models, associated with neuropsychiatric conditions, such as drug abuse, and with neurodevelopmental conditions, including Attention-Deficit/Hyperactivity Disorder (ADHD), with particularly interest in neurometabolic, neuroinflammatory and neurovascular processes. The group have also been involved in pinpointing the role of lifestyle including physical exercise as an interventional approach for brain health, at a fundamental level.

Research lines

Neurological diseases

Neuropsychiatric diseases

Diagnosis

Biomarkers

FLY COIMBRA LAB (FLYCAB): CELL BIOLOGY OF NEURONAL AGEING

Overview

6 Members
5 PhD holders
1 MSc students

> 8.6k € Funding

The work of the group explores the complexity of neuronal biology, focusing on understanding how intracellular trafficking influences neuronal function, and its role in healthy aging and neurodegeneration.

We combine in vivo studies in Drosophila melanogaster with cultured mammalian neurons, coupled to advanced microscopy approaches, behavioural assays, and tool development. We also wish to interrogate the fly genome to find potential new determinants of organismal fitness.

We hope our work will offer novel insights into avenues of intervention for age-related and neurodegenerative conditions by contributing significantly to our understanding of neuronal biology.

Publication highlights

Neurobiology of Aging. 2025.
DOI: 10.1016/j.
neurobiolaging.2025.05.002

Cell Death & Disease. 2025.
DOI: 10.1038/s41419-025-07511-5

Group leader
Alessio Vagnoni

Research lines

Regulation of intracellular trafficking during neuronal aging and neurodegeneration

Membrane contact sites organisation during neuronal aging and neurodegeneration

CRISPR/Cas9 genetic screens in drosophila to study developmental and aging trajectories

GUT-BRAIN AXIS

Overview

12 Members
4 PhD holders
2 PhD students
4 MSc students
2 Other staff

610k € Funding

We live in a world where several environmental factors that favor the development of chronic neurodegenerative and neuropsychiatric disorders are accruing. A cutting-edge area of research involves the gut-brain axis (GAin), in which the bidirectional communication between the enteric and central nervous systems via the vagus nerve also extends to endocrine, humoral, metabolic and immune pathways. Recent research indicates that a key regulator of this axis is the gut microbiota, in particular its composition and metabolites.

The main objectives of the GAin group are to validate a new paradigm for the etiology of neurodegenerative and neuropsychiatric diseases at the interface gut-brain; to study how dysfunctional mitochondria leads to deregulated immune responses and what is the impact on the central nervous system, taking into account their microbial origin and the echoes of eventual confrontations between their evolutionary ancestors, the mitochondria; to explore how gut immune cells change after microbiome transplants and bacterial infections in mice, and their impact on brain function and development; to elucidate the role of proteins such as ASYN that are hallmarks of neurodegenerative disorders and e) to understand how microRNAs (miRNAs) and circulating cell-free mitochondrial DNA (ccf-mtDNA) regulate gene expression, serving as signaling molecules along the gut-brain axis and as potential biomarkers for early detection and progression monitoring of gut-brain axis dysfunction in both neurodegenerative and gut inflammatory diseases.

To achieve these goals, models such as cell lines, mice and human tissue, as well as different techniques (flow cytometry, IHC/ICC, Seahorse, behavior and others) are used to understand and characterize the cellular and molecular mechanisms that underlie brain changes and to provide scientific bases for future studies in humans. The Gut-Brain Axis research group integrates researchers with complementary backgrounds, such as neurobiologists, biochemists, pharmacists and neurologists, allowing a more in-depth integrated perspective of the scientific questions. The group is also committed to the education of young highly motivated students, mostly at the PhD level.

Publication highlights

International Journal of Pharmaceutics. 2025. DOI: 10.1016/j.ijpharm.2025.126021

Antioxidants. 2025. DOI: 10.3390/antiox14080921

Journal of Inorganic Biochemistry. 2025. DOI:10.1016/j.jinorgbio.2024.112734

Neuroscience Bulletin. 2025. DOI: 10.1007/s12264-025-01498-x

Group leader

Sandra Morais Cardoso

Research lines

The gut-brain axis in the etiology of neurodegenerative and neuropsychiatric diseases

Mitochondrial signaling of neuronal innate immunity

The impact of gut immunity in the brain

ASYN as a bacteriostatic protein

miRNAs and ccf-mtDNA as new mediators of the gut-brain axis

MemBRAIN: NEURONAL SURFACE BIOLOGY

Overview

10 Members
4 PhD holders
2 PhD students
4 MSc students

679k € Funding

Neuronal communication, mediated by synaptic contacts within complex neural networks, is responsible for all our actions and behaviors, including movements, learning, the formation or evocation of memories, and even sleep. For synapses to form and function properly, neurons need to have molecules at the cell surface, such as cell-adhesion molecules. These proteins facilitate the formation of synapses at the appropriate time of development between certain types of neurons, for instance. Thus, the molecular and cellular mechanisms ensuring the transport and presence of these molecules on the neuronal surface are essential for the formation and functioning of the nervous system. When changes occur in these mechanisms that result in alterations in the distribution or function of these proteins, deficiencies in neuronal communication arise, which manifest as neurological changes observed in brain diseases and during aging.

The MemBRAIN research group studies the molecular and cellular mechanisms that control the distribution of cell-surface proteins in neurons (localization and abundance). It also investigates cell-surface proteins with unknown function in the brain. The group addresses these questions during the development of the nervous system, under pathological conditions such as neurodegenerative disorders, and also during aging.

To accomplish this, the MemBRAIN group uses research models such as primary rodent neuronal cultures, human neuronal cultures, rodent brain slices, viral vectors, and genetic and disease models in rodents. Main techniques used include live-cell imaging in neurons, proteomics, electrophysiology, various biochemical assays, as well as cutting-edge approaches in cellular and molecular biology, such as CRISPR-Cas9 for gene editing.
This approach not only allows us to understand the essential mechanisms underlying the formation and function of the nervous system but also to identify new therapeutic targets and strategies to mitigate the neurological changes that arise in brain diseases and aging.

Group leader

Luís Ribeiro

Research lines

Uncover cellular and molecular mechanisms underlying cell-body – axonal trafficking of neuronal surface cargoes during development

Elucidate the function of cell surface molecules, such as uncharacterized neuronal cell-adhesion molecules

Understand the impact of aging on neuronal trafficking underlying the defects in neuronal transmission and cognitive decline

Characterize pathological mechanisms of aging-associated chronic diseases, such as neurodegenerative disorders

MITOCHONDRIA & NEURODEGENERATIVE DISORDERS

Overview

9 Members
2 PhD holders
4 PhD students
3 MSc students

> 415k € Funding

The research group Mitochondria and Neurodegenerative Disorders has made acknowledged contributions in understanding early cellular mechanisms related with mitochondrial deregulation and neuronal signaling pathways in neurodegenerative conditions. The group aligns the interest in understanding the impact of mitochondrial (de)regulation, redox signaling and the activity of glutamatergic postsynapses, with the modulation of cell senescent markers in initial stages of neurodegenerative disorders.

The group resorts to biochemistry, cellular and molecular biology, imaging, electron microscopy and other techniques to analyze how neuronal communication and survival is affected specifically in rodent and human models of Huntington's disease (HD), a genetic disorder caused by expansion of CAG repeats, and Alzheimer's disease (AD), the most prevalent age-related brain disorder. Different therapeutic approaches have been also investigated in these brain pathologies. In HD the group found early mitochondrial and redox modifications in both human and mouse brains and peripheral cells, and early striatal structural changes and neurometabolic alterations in HD mouse model. Therapeutic approaches targeting mitochondria were assessed by enhancing mitochondrial sirtuin 3, activating the sigma-1 receptor with pridopidine or restoring the active form of Src kinase family; extracellular vesicles were also demonstrated to improve GABAergic transmission in HD human-like neurons. By investigating AD early pathogenesis and neuroprotection we defined the impact of chronic hyperglycemia on adult hippocampal neurogenesis and memory and how modulating epigenetics by decreasing the activity and/or expression of class I histone deacetylases influences ER-mitochondria crosstalk.

Publication highlight

Journal of Neurochemistry. 2025.
DOI: 10.1111/jnc.16222

Group leader
Ana Cristina Rego

Research lines

Transcription deregulation, mitochondrial dysfunction and senescence in AD

Impact of Tau on mitochondrial dynamics in AD

Glutamatergic postsynaptic SAPAP3 targeting mitochondria in HD

Early changes in Src kinase family and mitochondrial interactors in HD

NEURAL CIRCUITS OF SOCIAL BEHAVIOR

Overview

10 Members
8 PhD holders
2 PhD students

> 1.6M € Funding

Social interactions shape the way we perceive, feel and learn about the world, and despite its importance for social species, we still know very little about how the brain computes social information. The Neural Circuits of Social Behavior research group is interested in understanding the mechanisms of how social behaviour shapes our brain, and for this, the group focuses on cooperative social interactions in rodents. This group has demonstrated that Norway rats display prosocial behaviours in food foraging context, providing food to conspecifics, and identified the proximal mechanisms at the level of behaviour. Current and future projects aim to identify the neural circuits responsible for this fascinating social decision-making, using a combination of behavioural, anatomical, pharmacological, imaging and optogenetic tools in rodents.

Publication highlights

Journal of Neuroscience. 2025. DOI: 10.1523/JNEUROSCI.1701-24.2025

bioRxiv. 2025. DOI: 10.1101/2025.02.21.639526

ArXiv. 2025. DOI: 10.48550/arXiv.2512.24977

Group leader

Cristina Márquez

Research lines

Neural circuits of social behavior

Modulation of prosocial choices in rodents

NEUROENDOCRINOLOGY & AGING

Overview

The mission of the Neuroendocrinology and Aging research group is to contribute to develop new knowledge in the aging field, namely to demonstrate that neuroendocrine system and related mechanisms can be targeted in experimental models to delay, stop, and in some examples, reverse manifestations of aging and age-related disorders.

16 Members
6 PhD holders
5 PhD students
5 MSc students

283k € Funding

Publication highlights

GeroScience. 2025.
DOI: 10.1007/s11357-025-01574-0

Brain. 2025.
DOI: 10.1093/brain/awaf199

Aging Cell. 2025.
DOI: 10.1111/acel.14340

Trends in Molecular Medicine. 2025.
DOI: 10.1016/j.molmed.2025.11.002

European Respiratory Review. 2025.
DOI: 10.1183/16000617.0073-2025

Group leader
Cláudia Cavadas

Research lines

Hypothalamic control of aging

Neuroendocrine strategies and peptides as interventions to delay aging and age-related diseases

Nutrition approaches, such as caloric restriction, and related mechanisms, to delay aging and age-related diseases

Sleep and biological rhythms in aging and age-related diseases

Organs and tissues crosstalk in aging. Senescence, chronic inflammation and primary cilia in aging and disease

NEUROMODULATION

Overview

Adequate brain function depends on a balanced excitatory and inhibitory transmission fine-tuned by modulation systems. Inspired by the impact of coffee, which bolsters attention, normalizes mood and increases healthspan on ageing with a striking ability to prevent the onset of different neurodegenerative disorders (Alzheimer's, Parkinson's diseases), the aim of the group is to study modulation systems operated by purines (adenosine and ATP), known to be targeted by caffeine, to interfere with the evolution of neurodegenerative diseases. We have identified adenosine A2A receptors (A2AR) as the main targets of caffeine to control of brain disorders, using a combination of pharmacological, genetic and opto-genetic tools. We have established that A2AR are necessary and sufficient to trigger symptoms in different animal models of Alzheimer's or Parkinson's diseases, depression, epilepsy or diabetic encephalopathy, through a combined ability to restore synaptic plasticity, control neuroinflammation and bolster the metabolic support by astrocytes.

We have in-house different transgenic mice and pharmacologically-induced models of brain disease, as well as a toolbox to interfere with A2AR (cell-specific transgenic mice and viral mediated systems to bolster or decrease A2AR function) and access to human brain tissue. We follow an holistic approach to scientific questions, integrating our expertise in: i) behavior studies assessing learning and memory, motor performance, mood alterations and fear processing; ii) stereotaxic brain surgery; iii) ex-vivo (brain slices) electrophysiological studies to assess the function of brain circuits (extracellular recordings) and ionic currents (patch-clamp); iv) imaging of functional (live cell Ca^{2+}), morphological (histochemistry) and neurochemical alterations (receptor expression binding and trafficking), combining PCR, radioligands, FRET, proximity ligation assay and Western-blot techniques); v) subcellular fractionation of synaptosomes and gliosomes and use of cell cultures (neurons and astrocytes) to study neurotransmitters release and uptake.

Group leader

Rodrigo A. Cunha

Research lines

Coffee, caffeine and adenosine receptors controlling synaptic plasticity in brain diseases

Adenosine A2A receptors as biomarker and triggers of aging

Impact of purines on astrocyte-neuron communication and memory

Adenosine receptors in psychiatric disorders and neurodegenerative diseases

Role of adenosine A2A receptors in fear memory extinction

NEURONAL CIRCUITS & BEHAVIOR

Overview

14 Members
5 PhD holders
4 PhD students
5 MSc students

685k € Funding

The brain's capacity for complex sensory, emotional, and cognitive processing is established through a precise developmental program. The research conducted by the Neural Circuits and Behavior group aims to understand how genetic and environmental insults disrupt this program at the molecular, cellular, and circuit levels. The group focuses on the fundamental processes of neurodevelopment, as perturbations during critical windows in early-life can fundamentally rewire the brain, leading to disorders that persist and evolve across the entire lifespan.

The work of the group is organized around two complementary aims to define the rules that build brain circuitry:

- Genetic and environmental factors: examines how specific mutations and early environmental exposures alter the formation and maturation of neuronal networks, identifying key biological bottlenecks that drive pathology;
- Neuro-immune interactions: investigates how immune signaling intersects with neurodevelopment, shaping brain function under internal and external pressures from gestation through adulthood.

The group integrates rodent models to capture circuit-wide activity and behavioral outcomes, with human brain organoids to probe human-specific features of brain architecture. Across these systems, it uses approaches spanning molecular genetics, electrophysiology, and optogenetics to map disease-relevant circuits and uncover mechanisms that give rise to behavioral symptoms. Ultimately, the group aims to identify early interventions capable of redirecting developmental trajectories and improving outcomes across the lifespan.

Publication highlights

Journal of Neurochemistry. 2025.
DOI: 10.1111/jnc.16266

Journal of Neuroinflammation. 2025.
DOI: 10.1186/s12974-025-03588-z

Brain. 2025.
DOI: 10.1093/brain/awaf199

Molecular Psychiatry. 2025.
DOI: 10.1038/s41380-024-02715-1

Brain Behavior and Immunity. 2025.
DOI: 10.1016/j.bbi.2025.06.009

Group leader

João Peça

Research lines

Neurodevelopment & neurodevelopmental disorders

Neuroimmunology & microglia

Early life stress & brain wiring

Brain organoids & advanced models

Advanced tools for neuroscience

NEURONAL SIGNALING

Overview

18 Members
5 PhD holders
6 PhD students
7 MSc students

> 478k € Funding

Signaling mechanisms allow the interaction between neurons in the brain and orchestrate neuronal responses to stimuli coming from neighbor cells. Together, they determine the activity of neuronal circuits under normal physiological conditions, by acting at pre- and post-synaptic levels. Changes in intercellular and intracellular signaling mechanisms mediate the strengthening or weakening of the interaction between neurons, and are associated with many disorders of the nervous system.

The research conducted by the Neuronal Signaling group focuses on the mechanisms of regulation of the synaptic function by neurotrophins, which account for their role in long-term synaptic plasticity and in learning and memory formation, and how dysregulation of these processes contribute to several diseases of the nervous system; the role of mitochondria in synaptic regulation; the new molecular players underlying neuronal architecture changes in intellectual disability, such as Rett syndrome; how dysregulation of GABAergic synapses contribute to the increased neuronal excitability in epilepsy; and the alterations in proteostasis coupled neuronal death in brain ischemia and in Alzheimer disease. The group uses standard biochemistry, cellular and molecular biology, electrophysiology and behavioral approaches, complemented with *in vitro* (neuronal cultures) and *in vivo* models of disease, to address these questions.

Publication highlights

Brain. 2025.
DOI: 10.1093/brain/awaf203

Brain. 2025.
DOI:10.1093/brain/awaf448

Journal of Biomedical Science. 2025.
DOI: 10.1186/s12929-025-01164-4

Apoptosis. 2025.
DOI: 10.1007/s10495-025-02097-x

Neurochemical Research. 2025.
DOI: 10.1007/s11064-025-04346-6

Group leader
Carlos B. Duarte

Research lines

Regulation of glutamatergic synapses by BDNF in synaptic plasticity and in disease

The role of mitochondria in synaptic regulation

Molecular mechanisms of epileptogenesis: the role of GABAergic synapses

Excitotoxic injury in brain ischemia: the role dysregulation of the ubiquitin-proteasome system

The role of intra-axonal autophagy in the pathogenesis of Alzheimer's disease

REDOX BIOLOGY & BRAIN SENSING

Overview

19 Members
7 PhD holders
5 PhD students
7 MSc students

> 502k € Funding

Discovery of key pathways leading to cognitive impairment. Using rodent models of brain disease (Alzheimer´s disease, aging, hypoperfusion, and type 2 diabetes mellitus) and innovative microsensor technology, the group Redox Biology and Brain Sensing has identified the impairment of nitric oxide (NO)-dependent neurovascular coupling as the earliest dysfunctional process leading to disease pathology and cognitive impairment. The preclinical studies demonstrate the feasibility of developing diet-driven strategies to improve cognition in people at risk for cognitive impairment.

Neural interface technology development and innovation for the study of brain function and dysfunction. Design, development and application of state-of-the-art microelectrode-base (bio)sensors for the recording of neurochemical mediators in the brain with high spatial and temporal resolution, notably nitric oxide, oxygen, hydrogen peroxide, glucose, lactate and glutamate. These technologic developments permitted to implement multiplexed and multimodal measurements in vivo in the rat brain that provided simultaneous neurometabolic, hemodynamic and electrophysiological information in rat brain to uncover the coupling between neuronal activity and local hemodynamics, to establish hydrogen peroxide as a volume signaling neurotransmitter in the brain and to enable the simultaneously monitoring of metabolic alterations and ongoing electrical activity under healthy and disease conditions.

Translational studies in dementia. Ongoing clinical trial with neurological patients aimed at improving cognitive performance via dietary intervention based on the description of a molecular mechanism in pre-clinical models of pre-dementia. This is a collaboration of CIBB with the Neurology Department of the Coimbra Local Health Unit and Institute for Nuclear Sciences Applied to Health (ICNAS).

Publication highlights

Electrochimica Acta. 2025.
DOI: 10.1016/j.electacta.2024.145447

Methods in Molecular Biology. 2025.
DOI: 10.1007/978-1-0716-4264-1_2

Applied Sciences. 2025.
DOI: 10.3390/app15137084

European Journal of Clinical Investigation. 2025.
DOI: 10.1111/eci.70149

Group leader

João Laranjinha

Research lines

Neurovascular coupling and cognition

Neurometabolic (de)coupling and modulation by biological oxidants

Diet and physical exercise in neurodegeneration

Microbiome-host redox interactions

Neural interface technology development and innovation for the study of brain function and dysfunction

SYNAPSE BIOLOGY

Overview

19 Members
7 PhD holders
6 PhD students
5 MSc students
1 Other staff

> 1.5M € Funding

The Synapse Biology research group studies how memories, thoughts, and behavior emerge from changes in synaptic communication. Synapses, the specialized connections between neurons, adjust their strength to encode and process information, forming the cellular basis of brain function. Despite their importance, the mechanisms by which synapses transform activity into lasting functional changes remain only partially understood.

The group investigates the cellular and molecular regulation of neuronal excitability, synaptic function, and synaptic plasticity, and how their disruption leads to neuropsychiatric, neurodegenerative and neuroimmune disorders.

The group uses a multidisciplinary and integrative research strategy that combines multiple experimental models, including cultured neurons, rodent brain slices, animal models, genetically engineered human neurons, and postmortem human brain tissue. Our approach includes molecular, biochemistry and omics approaches, computational biology, advanced imaging techniques (such as expansion microscopy), electrophysiology, and behavioral analysis. This combination of methods allows us to link molecular events at synapses to circuit function and behavior.

Defects in synaptic function are a common hallmark of brain disorders. Genetic variants in synaptic proteins are linked to intellectual disability, autism spectrum disorders, and schizophrenia, while early synaptic dysfunction is thought to underlie age-related neurodegenerative diseases. We also study experience-dependent changes, including the effects of stress, and immune-mediated mechanisms such as autoantibodies targeting central nervous system proteins. By identifying how synaptic dysfunction contributes to disease, the work of the group aims to provide a foundation for the rational development of targeted therapies.

Publication highlights

Molecular Psychiatry. 2025.
DOI: 10.1038/s41380-024-02715-1

Trends in Neurosciences. 2025.
DOI: 10.1016/j.tins.2025.06.001

Advanced Science. 2025.
DOI: 10.1002/advs.202502216

Science Advances. 2025.
DOI: 10.1126/sciadv.adr9986

Group leader

Ana Luísa Carvalho

Research lines

Investigating the coordination of synaptic and intrinsic plasticity and its dysregulation in neurodevelopmental disorders

Understanding the synaptic response to chronic stress, including in conditions such as depression and long COVID-19

Understanding how immune-mediated or genetic disruption of synaptic proteins impairs neuronal development and synaptic function in neurodevelopmental disorders

Elucidating how autoantibodies target synaptic proteins in autoimmune neurological diseases

Investigating how TDP-43 loss of function contributes to synaptic impairment and neuronal hyperexcitability in Alzheimer's disease

VISION DISEASES

Overview

37 Members
19 PhD holders
6 PhD students
12 MSc students

> 1M € Funding

Vision diseases, including age-related macular degeneration (AMD), diabetic retinopathy, glaucoma, and inherited retinal diseases (IRDs), affect more than 400 million people worldwide. These diseases have no cure, and the treatments available are scarce and not effective in many patients. Moreover, biomarkers for early diagnosis, disease progression and response to therapy are also scarce or lacking.

The main goals of the Vision Diseases research group are:

- To clarify the molecular and cellular mechanisms underlying retinal dysfunction/degeneration, blood-retinal barrier breakdown, and neovascularization, giving a particular attention to microglia-mediated neuroinflammation and to cell-cell crosstalk mediated by extracellular vesicles, and other mediators, as well as to evaluate the role of extracellular vesicles in spreading cellular senescence;
- To identify new therapeutic targets;
- To develop and validate advanced disease models based on hiPSC technology, including hiPSC-derived retinal pigment epithelium (RPE), endothelial cells (ECs), photoreceptor precursor cells (PPCs), and retinal organoids, using gene-editing approaches to introduce or correct disease-causing mutations and to perform targeted gene ablation, thereby enabling robust mechanistic studies and the development and evaluation of therapeutic strategies, also including optic nerve regeneration and microsponges;
- To dissect the impact of preliminary immune challenges on the retina upon undergoing a secondary chronic insult;
- To identify novel biomarkers (structural, cellular, molecular), also in the ocular surface, particularly for early disease diagnosis, but also for disease progression and response to therapy;
- To identify novel clinical endpoints for clinical trials in AMD;
- To dissect the interplay between diet, life-style and genetic risk in AMD;
- Epidemiology of IRDs;
- To identify patients at risk of dementia by assessing the retina in diabetic patients, and common pathways underlying retinal and brain dysfunction and degeneration.

Publication highlights

Cell Communication Signal. 2025. DOI: 10.1186/s12964-025-02587-0

Progress in Retinal and Eye Research. 2025. DOI: 10.1016/j.preteyeres.2025.101391

Ophthalmology and Therapy. 2025. DOI: 10.1007/s40123-025-01179-y

Ophthalmology Retina. 2025. DOI: 10.1016/j.oret.2024.11.002

Investigative Ophthalmology & Visual Science. 2025. DOI: 10.1167/iovs.66.1.7

Group leader

Francisco Ambrósio

Research lines

Molecular and cellular mechanisms underlying retinal degenerative diseases using in vitro and animal models

To develop and validate advanced disease models, including models based on hiPSC technology

Interplay between diet, life-style and genetic risk in AMD

Biomarkers of disease, disease progression and response to therapy

Advanced therapies

METABOLISM, AGING & DISEASE

Unraveling the metabolic landscapes of chronic diseases, with emphasis on those that are environment or aging-related, in an integrative and interdisciplinary approach from *in vitro* to animal models, human samples, and patients.

Coordinator

Paulo Oliveira

Group Leader

João Ramalho-Santos
Isabel Carreira
Henrique Girão
Maria Teresa Cruz
John Jones
Flávio Reis
Paulo Oliveira
Nuno Raimundo

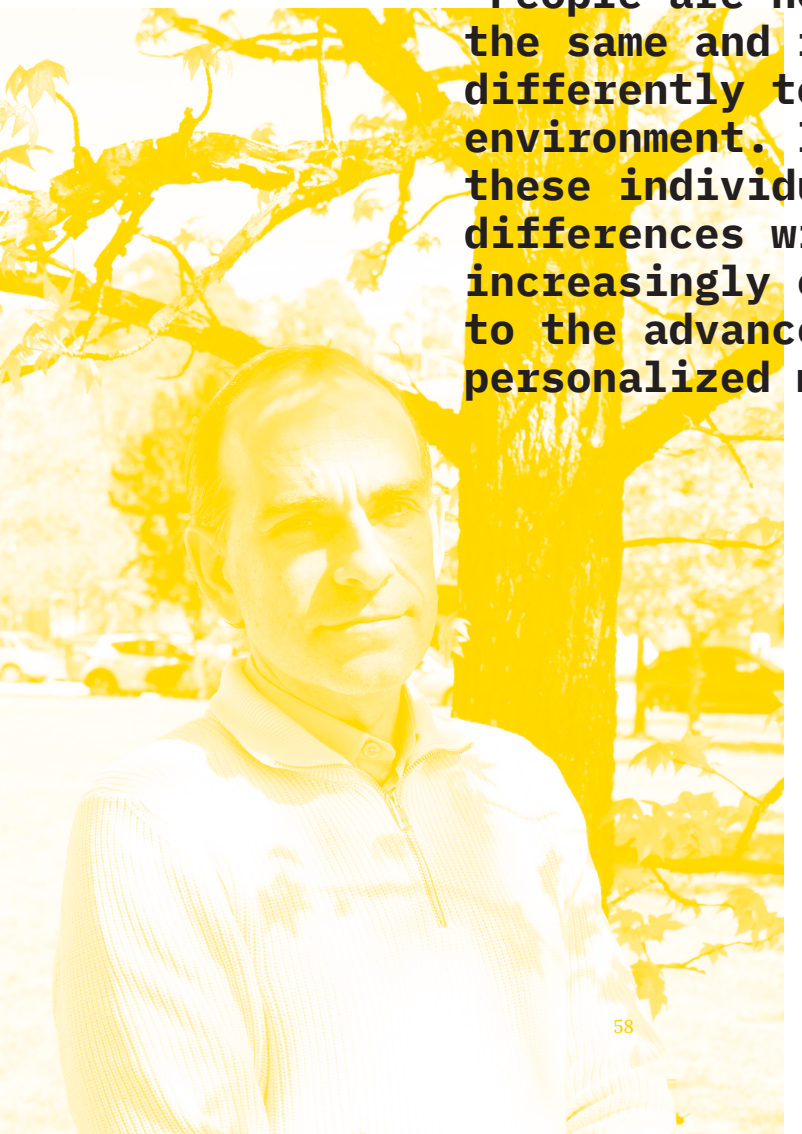
Group

Biology of Human Reproduction and Infertility
Biomarkers in Translational and Clinical Oncology
CARDICT: Cellular and Translational Cardiology
Immunometabolism and Stress Responses
Metabolic Modelling and Systems Biology
Metabolic Risk and Nutrition
Mitochondrial Biology in Aging and Disease
Organelle Crosstalk in Aging and Disease

Exploring the Integration of Body and Environment

The Metabolism, Aging and Disease research area is expected to evolve significantly in the coming years, as the understanding of pathologies moves beyond a focus on the cell's molecular and metabolic mechanisms to embrace the exposome—the full range of environmental exposures and stimuli surrounding an individual.

"People are not all the same and respond differently to their environment. Integrating these individual differences will be increasingly essential to the advancement of personalized medicine"



The discoveries made in 2025 within CiBB's Metabolism, Aging and Disease area continued to stand out for their strong connection to clinical practice, one of the area's greatest strengths. Every research group, without exception, carries out highly interdisciplinary and truly remarkable work, matching the highest standards of research conducted worldwide. I strive to ensure that research is performed with the utmost rigor and transparency, without fear of reporting negative results. Only in this way can we produce science that is both impactful and of high quality.

In 2025, we positioned metabolism as a central axis linking ageing, metabolic and cardiovascular diseases, cancer, mitochondrial disorders, inflammation, and reproductive health. Advances included mitochondrial and lysosomal dynamics, interorganelle communication, obesity and diabetes, adipose regulation, early-life programming, diet-induced effects, and related complications. We also identified molecular and clinical biomarkers in hematological and mitochondrial diseases, while expanding translational work in inflammation, gut–immune interactions, cell communication, and male reproductive health.

Integrating the individual within their environmental context has become an increasingly important focus of this research area. The European project PAS GRAS is a flagship initiative in this regard: it brings together several research groups with the goal not only of understanding the mechanisms underlying obesity and overweight, but also of promoting reflection on these conditions and developing preventive strategies.

During 2025, we achieved several advances within PAS GRAS, particularly through the study of numerous bioactive compounds present in the Mediterranean diet and their anti-obesogenic effects. One of the objectives of PAS GRAS is to develop algorithmic models capable of predicting the risk of obesity, overweight, and related complications. We have also been studying how maternal obesity contributes to an increased risk of metabolic diseases later in life.

Metabolic, rheumatic, and cardiovascular diseases are on the rise, as are certain types of cancer, which is why this research area is expanding rapidly worldwide. The trend is driven not only by an individual's genetics and epigenetics but also by the exposome.

This includes factors such as whether a person exercises or leads a sedentary lifestyle, whether they live in a polluted environment or have access to safe spaces for walking and outdoor activity, as well as socioeconomic conditions, mental health or climate changes.

The idea of a metabolic fingerprinting is emerging, a method that may one day enable the creation of individual metabolic profiles. We do not yet know exactly how this assessment will be performed, but it may represent a pathway towards increasingly personalized medicine. Mitochondrial transplantation, alongside modelling approaches, will also attract growing attention. Horizontal mitochondrial transfer may play a very important role in the treatment of severe diseases that currently have no cure and is now being explored by several research groups.

“We are living increasingly fast-paced, urbanized, and anxiety-driven lifestyles, which is detrimental to metabolic health”

Eating together at the table and sharing meals with family is one of the core principles of the Mediterranean diet, which has a strong anti-obesogenic effect. It is not only about what is served on the table but also about how meals are shared socially, often outdoors. Increasingly, people have less time for this. **The socioeconomic inequalities observed worldwide today have already shown us that the prevalence of metabolic diseases decreases when socioeconomic advantages are present. We are living in an era of “time poverty,” which limits the ability to maintain a healthy lifestyle.**

We can foresee more serious consequences in the future, particularly for younger generations. Within one or two decades, metabolic diseases that previously would have emerged at the age of 70 may begin to appear at 30 or 40 years of age.

This would represent an extremely serious problem and place a substantial burden on national healthcare systems. We need greater investment, more research and a stronger commitment to improving public literacy on these issues.

In the future, science will need to become increasingly rigorous, transparent, and open. We will need science to be recognized more widely as a guiding force for industrial and political decisions. Scientific knowledge can and should influence the food industry and encourage the production of fewer processed foods.

Although achieving this objective is extremely challenging, we should not stop trying to convey this message to policymakers at regional, national, and international levels. However, the most important outreach work still to be done lies in the direct relationship between scientists and the public—otherwise, this meaningful progress will be impossible to achieve.

BIOLOGY OF HUMAN REPRODUCTION & INFERTILITY

Overview

20 Members
8 PhD holders
4 PhD students
8 MSc students

> 200k € Funding

The research group Biology of Human Reproduction and Infertility works in close collaboration with Coimbra Local Health Unit, and performs research both in the basic biology of gametes and stem cells (focusing on metabolism aspects) and translational projects related to infertility, assisted reproduction and fertility preservation. The goal is to understand the molecular mechanisms involved and directly improve clinical procedures, including communicating with patients.

Research projects on the male side include the proteomics-based search for sperm biomarkers of unexplained infertility, as well as tools to monitor sperm quality. The group is also interested in the potential effect on male fertility of environmental contaminants that may act as endocrine disruptors, and in spermicide-based male contraception.

On the female side, the two main projects involve using both human samples and animal models to perfect the cryopreservation of ovarian tissue for oncology patients, and molecular strategies to revert aging-related effects in oocytes.

The group also works on the metabolism of stem cells and how the manipulation of metabolic pathways can modulate their behavior and properties, notably of pluripotent stem cells, with findings that may have relevance for embryo assessment in assisted reproduction.

Finally, the group is very involved in projects related to outreach, education and science communication activities, including co-creation initiatives specifically targeted to different audiences, focusing on issues related to metabolism-dependent aspects of human health.

Publication highlights

Sleep Medicine Reviews. 2025.
DOI: 10.1016/j.smrv.2025.102080

Andrology. 2025.
DOI: 10.1111/andr.70020

Sustainable Development. 2025.
DOI: 10.1002/sd.70012

Nature Medicine. 2025.
DOI: 10.1038/s41591-025-03721-8

Reproduction. 2025.
DOI: 10.1530/REP-25-0119

Group leader
João Ramalho-Santos

Research lines

Infertility and gamete quality

Fertility preservation

Metabolism and stem cell fate

Contraception, endocrine disruptors and fertility

Science communication and outreach

BIOMARKERS IN TRANSLATIONAL & CLINICAL ONCOLOGY

Overview

104 Members
31 PhD holders
23 PhD students
50 MSc students

> 1.2M € Funding

The main focus of the Biomarkers in Translational and Clinical Oncology research group is towards the identification of biomarkers relevant for tumor characterization, early cancer detection, diagnosis, prognosis and therapy response. Through these biomarkers it is possible to do stratification of patients and select the best therapy or drug combination. This has also an impact on the identification of new therapeutic targets.

Specifically, the group objectives are:

- Characterizing through omics' approaches and phenotypic signatures tumor samples, tumor microenvironment and liquid biopsies in order to identify/detect biomarkers, to improve classification, to monitor cancer progression and to evaluate drug response (namely drug resistance);
- Analyzing the efficacy of new molecular targeted therapies, alone or in combination with other new drugs and/or conventional agents, identifying which of them will circumvent/modulate drug resistance in order to improve patient outcomes;
- Correlating the omics results with patient's clinical features, contributing to the understanding of the more aggressive diseases, survival and prognostic risk factors

How to attain the objectives:

- By high-throughput molecular technologies, copy number variants, mutational and methylation status;
- Gene and protein expression will give the molecular profiles of the tumor and its correlation with peripheral biomarkers using liquid biopsies;
- Disease models, from mathematical to preclinical and clinical models, assisted by bioinformatics and artificial intelligence are used to establish the genotype-phenotype correlation and improve translational analysis and precision medicine.

Publication highlights

Photochemical & Photobiological Sciences. 2025.
DOI: 10.1007/s43630-025-00781-0

EJNMMI Physics. 2025.
DOI: 10.1186/s40658-025-00746-3

Frontiers in Immunology. 2025.
DOI: 10.3389/fimmu.2025.1516793

International Journal of Molecular Sciences. 2025.
DOI: 10.3390/ijms26125682

Medical Sciences (Basel). 2025.
DOI: 10.3390/medsci13030167

Group leader
Isabel Carreira

Research lines

Biomarkers and oncobiology

Cancer clinic and therapeutics/clinical oncology

Theranostics in cancer models

Human genome variation

Resistance to anticancer therapeutics

CARDICT: CELLULAR & TRANSLATIONAL CARDIOLOGY

Overview

29 Members
16 PhD holders
7 PhD students
6 MSc students

722k € Funding

Cardiovascular diseases (CVD), affecting the heart and blood vessels, are a leading cause of morbidity and mortality worldwide and represent a major burden for health care systems. One of the major risk factors for CVD is diabetes mellitus (DM), which is associated with both micro and macrovascular complications. Obesity, hypertension and dyslipidemia are also common in patients with DM, placing them at increased risk for cardiac events. A successful approach to a complex clinical issue, which can lead to personalized medicine and pave the way towards the development of more precise diagnosis tools and more efficient and effective therapies, implies a holistic and integrative perspective of cardiovascular diseases.

The CARDICT research group combines strong synergies of expertise and skills from fundamental scientists and clinicians. The main objective of the group is to foster an interdisciplinary approach to leverage translational research, grounded on a comprehensive perspective from molecule to man. To boost the existing capacities and competencies, crossing canonical and static boundaries between disciplines, this line brings together basic researchers and clinicians, supporting a strategy “from bench to bedside and back again”.

The group investigates the strategies whereby cardiac cells communicate and the mechanisms involved in the maintenance of a healthy proteome. More specifically, it aims to elucidate how the disturbance of protein degradation and intercellular communication systems can contribute to CVD, with a particular focus on autophagy and gap junction and extracellular vesicle communication. Additionally, the group is interested in the cellular and molecular mechanisms underlying the metabolic dysregulation associated with obesity, prediabetes, diabetes and its major vascular complications, focusing on oxidative stress, glycation, inflammation, dysbiosis and autonomic gastrointestinal dysfunction.

Publication highlights

Phytomedicine. 2025.
DOI: 10.1016/j.phymed.2024.156334

EMBO Reports. 2025.
DOI: 10.1038/s44319-025-00613-3

Journal of the American College of Cardiology. 2025. DOI: 10.1016/j.jacc.2025.04.010

Trends in Biochemical Sciences. 2025.
DOI: 10.1016/j.tibs.2025.04.005

Cardiovascular Research. 2025.
DOI: 10.1093/cvr/cvaf023

Group leader

Henrique Girão

Research lines

Cellular and molecular mechanisms of cardiovascular diseases, with a particular emphasis on the regulatory processes implicated in intercellular communication and intracellular trafficking and protein degradation

Innovative therapies to cardiovascular diseases, resorting to medicinal plant-based approaches to tackle heart failure and pulmonary arterial hypertension

Translational research in cardiovascular diseases, with focus on cardiac amyloidosis, atherosclerosis and vascular dysfunction

Heart valve disease and transplantation, with emphasis on cardiac remodelling, valve calcification and replacement

IMMUNOMETABOLISM & STRESS RESPONSES

Overview

51 Members
12 PhD holders
20 PhD students
16 MSc students
3 Other staff

600k € Funding

The organism's interaction with its natural surroundings is crucial for vital functions such as energy extraction, antioxidant/micronutrient uptake, pathogen protection, epithelial barrier maintenance, and neuronal fitness. However, inadequate relationships disrupt homeostasis, leading to health concerns such as cancer, inflammatory conditions, allergic reactions, infectious and brain diseases.

To understand how lifestyle and environmental factors contribute to disease, the Immunometabolism and Stress Responses research group focus on three main areas that are studied using advanced state-of-the-art technologies (e.g., flow cytometry, confocal microscopy, gene expression profiling, metagenomics):

- **Brain diseases:** protein misfolding, endoplasmic reticulum (ER) stress, mitochondrial dysfunction and inflammation are key factors in brain diseases. The group aims to explore the role of the immune-nervous system axis and cellular stress response mechanisms, such as inflammation, lipid metabolism, calcium homeostasis and ER-mitochondria contacts, in neuropsychiatric disorders and to discover novel treatment strategies, namely BACE1 inhibitors and Nrf2-targeting compounds.
- **Body barrier diseases:** body barriers are populated by innate-like T cells that respond rapidly to harmful signals. We aim to understand how these cells are influenced by environmental cues within the intestinal mucosa, particularly dietary signals, to further clarify the mucosal biology and the impact of health challenges such as infections, inflammation, and cancer. The interactions between environmental factors and mucosa's immune and epithelial cells and skin are also studied to identify molecular targets to mitigate allergic diseases.
- **Microbiomes & metabolism:** microbiomes significantly impact host metabolism and health. We study microbial interactions and effects on hosts, focusing on the impact of intestinal microbiomes in cardiometabolic diseases. In addition, we seek to identify microbiome's proteins with biotechnological value.

Publication highlights

Nature Immunology. 2025. DOI: 10.1038/s41590-025-02326-0

Journal of the American Academy of Dermatology. 2025. DOI: 10.1016/j.jaad.2025.12.079

International Journal of Molecular Medicine. 2025. DOI: 10.3892/ijmm.2025.5654

Frontiers in Cellular and Infection Microbiology. 2025. DOI: 10.3389/fcimb.2025.1543100

Journal of Pharmaceutical Analysis. 2025. DOI:10.1016/j.jpha.2024.101071 *(the basis of the international patent Topical composition and uses thereof* (PCT/IB2023/057222))

Group leader
Maria Teresa Cruz

Research lines

Body barriers

Microbiomes

Inflammation and immune system

Cellular stress and brain diseases

METABOLIC MODELLING & SYSTEMS BIOLOGY

Overview

7 Members
3 PhD holders
2 PhD students
2 MSc students

170k € Funding

Intermediary metabolism refers to the intracellular processes by which nutrient carbons are biochemically transformed into storage or structural cell products. The mission of the Metabolic Modelling and Systems Biology research group is to develop methodologies for measuring and modeling these processes in living systems. The objectives of the group include the application of these measurements to better understand nutrient metabolism in diseases such as type 2 diabetes (T2D) and metabolic-associated steatotic liver disease (MASLD), whose increased incidences are in part related to changes in food intake. The applied techniques are based on the use of stable-isotope metabolic tracers coupled with noninvasive assays of key metabolites that encode the labeling information from the tracers. The group's expertise is in the use of nuclear magnetic resonance (NMR) and mass-spectrometry (MS) techniques to acquire more precise information on the metabolic fate of the isotopic tracers. This in turn allows the development of more detailed and realistic metabolic flux models to describe nutrient metabolism. Currently, the group is focused on the metabolism of glucose and fructose by the liver. Sugar consumption in western societies has sharply increased in recent decades and is implicated in the surge of T2D and MASLD in these communities. Transformation of sugars into lipids may play an important role in the onset and progression of these diseases.

Publication highlights

Journal of Proteome Research. 2025.
DOI: 10.1021/acs.jproteome.5c00040

Nature Medicine. 2025.
DOI: 10.1038/s41591-025-03721-8

Molecular Metabolism. 2025.
DOI: 10.1016/j.molmet.2025.102273

Journal of Biological Chemistry. 2025.
DOI: 10.1016/j.jbc.2025.108503

Group leader
John Jones

Research lines

Characterizing alternative pathways of hepatic glucose metabolism in patients with diabetes

Coupling of sugar metabolism with fatty acid synthesis fluxes in type 2 diabetes and MASLD patients

Characterizing hepatic pentose phosphate pathway metabolism in healthy and diabetic subjects

Applying deuterated water to study biosynthetic fluxes in different organisms

METABOLIC RISK & NUTRITION

Overview

54 Members
14 PhD holders
19 PhD students
9 MSc students
12 Other staff

1.5M € Funding

The research group Metabolic Risk and Nutrition is composed of researchers and clinicians, in an inter-disciplinary and translational approach that goes from the molecular level to impact on human health. Using a variety of approaches, including animal models and human samples, at different disease stages, the group general aims are:

- to dissect the mechanisms underlying the metabolic dysregulation associated with obesity, insulin resistance, prediabetes, T2D and its major vascular complications;
- to identify disease biomarkers, particularly at early stages;
- to evaluate the impact of therapeutic and nutraceutical interventions.

The following three sub-groups with independent laboratories and complementary expertise converge towards these goals:

- Therapeutics and nutraceuticals for chronic inflammatory diseases
- Obesity, diabetes and complications
- Neuroendocrinology of obesity

Some of the group's ongoing research topics are:

- molecular and cellular mechanisms linking obesity, insulin resistance and type 2 diabetes to vascular and neurodegenerative complications;
- inflammation, gut dysbiosis and immune-metabolic crosstalk between central and peripheral organs in metabolic diseases;
- modulate the gut–microbiota–immune axis through immunonutrition and microbiota-based interventions, including prebiotics and phytochemical-based strategies, for chronic inflammatory and metabolic diseases;
- neuroendocrine regulation of adipose tissue and sympathetic modulation as novel anti-obesity strategies;
- development of innovative therapeutic strategies, including bioactive peptides, hydrogels and PTP1B-targeted approaches, to improve diabetic wound healing.

Publication highlights

European Journal of Clinical Investigation. 2025.
DOI: 10.1111/eci.70090

Clinical and Experimental Medicine. 2025.
DOI: 10.1007/s10238-025-01798-6

Frontiers in Immunology. 2025.
DOI: 10.3389/fimmu.2025.1682183

Ageing Research Reviews. 2025.
DOI: 10.1016/j.arr.2024.102619

Biomaterials Advances. 2025.
DOI: 10.1016/j.bioadv.2025.214337

Group leader

Flávio Reis

Research lines

Metabolic dysregulation in obesity, prediabetes and type 2 diabetes and their vascular/neurodegenerative complications

Neuroendocrine regulation of energy balance and adipose tissue function in obesity and diabesity

Immunonutrition and microbiota-based interventions, including next-generation prebiotics, for chronic inflammatory and metabolic diseases

Biomaterial- and peptide-based therapeutic platforms for diabetic wound healing and tissue regeneration

Health literacy programs on metabolic diseases

MITOCHONDRIAL BIOLOGY IN AGING & DISEASE

Overview

53 Members
22 PhD holders
23 PhD students
8 MSc students

935k € Funding

Mitochondria are central regulators of cellular energy production, cell death, redox and calcium homeostasis, and intermediary metabolism. The primary objective of the Mitochondrial Biology in Aging and Disease research group is to identify alterations in mitochondrial metabolism, redox signaling, and stress responses associated with chemical toxicology and the pathophysiology of aging, lifestyle-related conditions, and genetic diseases, supporting the development of effective therapeutic strategies.

The group's research is structured around three main areas:

- **Mitochondria in aging and lifestyle-related diseases:** the group investigates mitochondrial dysfunction in aging- and lifestyle-associated conditions, including metabolic dysfunction–associated steatotic liver disease, sarcopenia, diabetes, cardiovascular disease, Parkinson's and Alzheimer's diseases, amyotrophic lateral sclerosis, and cancer. The group also addresses drug-induced mitochondrial toxicity caused by anthracyclines, environmental contaminants, and nanoparticles. In addition, it explores how in utero conditions, including maternal nutrition, influence metabolic disease susceptibility in adulthood.
- **Mitochondrial bigenomics and theragnostics:** using biomolecular genetics, the group supports functional genomics through exome sequencing and next-generation sequencing analysis of mitochondrial DNA (mtDNA) variants. It identifies genetic alterations and copy number variations associated with metabolic phenotypes and potential theragnostic targets, contributing to precision medicine approaches.
- **Mitochondria-targeted therapeutics:** the group examines intrinsic, pharmacological, and non-pharmacological interventions (including exercise and diet) that regulate mitochondrial biogenesis, metabolism, and quality control to mitigate organ injury during disease and chemical exposure. It explores mitochondria-targeted antioxidants derived from dietary components, plant (phytochemicals)- and fungi-based natural compounds, and novel pharmacological strategies.

Publication highlights

Nature Medicine. 2025.
DOI: 10.1038/s41591-025-03721-8

Biochimica et Biophysica Acta (BBA) — Bioenergetics. 2025.
DOI: 10.1016/j.bbabio.2025.149535

Nature Communications. 2025.
DOI: 10.1038/s41467-025-65451-2

Biochimica et Biophysica Acta — Molecular Basis of Disease. 2025.
DOI: 10.1016/j.bbadis.2025.167902

European Journal of Clinical Investigation. 2025.
DOI: 10.1111/eci.70051

Group leader

Paulo Oliveira

Research lines

Mitochondria in aging and lifestyle-related diseases

Mitochondrial bigenomics and theragnostics

Mitochondria-targeted therapeutics

ORGANELLE CROSSTALK IN AGING & DISEASE

Overview

10 Members
5 PhD holders
3 PhD students
2 MSc students

Cells work as a small machine in which the different components (organelles) are coordinated with each other, as in a car. When that coordination between organelles is lost, there is development of pathologies that affect muscles (including the heart), liver, eyes, ears, and nervous system. The goal of Organelle Crosstalk in Aging and Disease research group is to understand how cellular organelles crosstalk with each other so that we can avoid diseases caused by the loss of that coordination. The group uses mammalian models (mouse) and cellular (human, mouse, rat) to tackle these questions and define novel therapeutic strategies to neurodegenerative, muscular and other diseases.

Publication highlight

EMBO Reports. 2025.
DOI: 10.1038/s44319-025-00613-3

Group leader

Nuno Raimundo

Research lines

Organelle crosstalk

Mitochondria

Lysosomes

Endoplasmic reticulum

Peroxisomes nucleus

Multi-omics

Aging

INNOVATIVE THERAPIES

Promoting interdisciplinary research that can be translated into the development of innovative tools and approaches for prevention and treatment of a selected group of disorders that are exacerbated in the aged population, such as neurodegenerative, ischemic, infectious and cancer diseases.

Coordinator

Lino Ferreira

Group Leader

Hugo Fernandes
Lino Ferreira
Irina Sousa Moreira
Miguel Mano
Bruno Manadas
Carlos Filipe Pereira
Teresa Gonçalves
Jorge Salvador
Isaura Simões
Nuno Empadinhas
Ana Eulálio
João Nuno Moreira
Luís Pereira de Almeida

Group

ACT — Advanced Cell Technology
Advanced Therapies
Data-Driven Molecular Design
Functional Genomics and RNA-based Therapeutics
Functional Proteomics in Health & Disease
Immune Cell Reprogramming
Medical Microbiology
Medicinal Chemistry and Drug Discovery
Molecular Biotechnology and Protein Engineering
Molecular Microbiology and Microbiome
RNA & Infection
Tumor Microenvironment and Targeted Therapies
Vectors, Gene and Cell Therapy

At the Forefront of Scientific and Socioeconomic Innovation

In the coming years, much of the progress in the field of Innovative Therapies will be linked to its three Teaming for Excellence projects: MIA-Portugal, GeneT, and the Institute for Integrated Social and Biological Assessment, which is set to launch in 2027.

“Central Portugal and CiBB, in particular, have been leading the way in such a demanding field as clinical application”

Within CiBB’s Innovative Therapies area, five studies stood out in 2025, conducted by five different research groups. These studies focused on gene therapy and neurodegenerative diseases, cellular reprogramming, infection—both in relation to the gut-brain axis and the interaction between bacteria and human cells—and aging.

Over the coming years, much of the development in the Innovative Therapies field will be tied to its three Teaming for Excellence projects: MIA Portugal, GeneT, and the Institute for Integrated Social and Biological Assessment, scheduled to begin in 2027. It is truly remarkable how CiBB and the region of central Portugal have distinguished themselves through their proposals in attracting this European funding.

There have been very interesting contributions to innovation in central Portugal.. This is linked to a culture of intellectual property protection and incentive awards that encouraged the translation of projects developed within academia. This culture began about two decades ago with the creation of the Intellectual Property Office at the University of Coimbra. From 2008/2009 onwards, some research groups also began establishing their own spin-offs. In this respect as well, central Portugal was a pioneer.

It should be noted that the region had already benefited from other initiatives that continue to act as catalysts for research in Innovative Therapies—such as the creation of the Pedro Nunes Institute, Biocant Park, and the Clinical Trials Unit of the Coimbra Academic and Clinical Centre. **In my view, and perhaps more intensely than in other regions, the central region has made a very significant contribution to translating technologies from a low Technology Readiness Level (TRL) to a higher TRL.**

The growth of central Portugal in this field will, in fact, mirror global growth. Advanced Therapies is a very broad field in which we will see numerous developments, ranging from gene editing and new vectors for messenger RNA delivery to infection research, where clear progress has been made; cancer treatment through cellular reprogramming; and vaccine development, with the creation of vaccines more powerful than those available today. I believe that the next ten years will bring major advances in Innovative Therapies.

At CiBB, the coming years will be marked by the launch of the Institute for Integrated Social and Biological Assessment. This project addresses the need to investigate the contribution of social interventions to human biology, adding complexity to our understanding of health challenges. It is a project with an highly integrative and interdisciplinary vision, with an innovative approach that aims to have a real impact on public well-being and public policy.

“The Institute for Integrated Social and Biological Assessment is a futuristic project in the way it approaches health challenges”

It remains necessary to build bridges between academia, research centers, and innovation, creating spin-offs and business ventures. **One of our major challenges is to retain intellectual property within our territory and create teams that encompass economic, scientific, and biotechnology expertise so that these projects can be translated into practice, take root, and grow.**

On the other hand, it has become genuinely difficult to motivate younger generations to pursue research careers. **Portugal also needs mechanisms to make scientific careers more attractive and to provide suitable working conditions for young researchers.** Their projects will give rise to technology-based companies—the type of companies Portugal needs.

We also need to integrate transformative profiles into universities in cutting-edge fields. In the area of Innovative Therapies, many of the leading research groups do not have a direct connection to academic units. This is a very important aspect if future challenges in innovation and competitiveness are to be addressed more effectively.

I believe that science should be part of our general literacy. We need to make an effort, beginning at a very early stage in schools, to demystify the role of the researcher and stimulate people’s curiosity about science and scientists. This can be valuable in combating misinformation and disinformation. **Science communication is also closely linked to the future of science.**

It is also important to develop new models for conducting research and science. One such model should involve the creation of research institutes supported by business projects. The State should also evaluate how to make the best use of these emerging models, for example through joint ventures with the private sector. These models are changing the way science is conducted today, and they may represent a very interesting opportunity for Portugal.

ACT: ADVANCED CELL TECHNOLOGY

Overview

7 Members
3 PhD holders
1 PhD students
3 MSc students

1M € Funding

Inspired by the basic principles of Cell Biology, the Advanced Cell Technology research group aims to restore and regenerate damaged or worn out tissues. The group uses high-throughput screening approaches and stem cell-based assays to identify small molecules and miRNAs capable of enhancing tissue function and/or regeneration, and nature-inspired delivery systems for in vivo delivery of the selected molecules. The Advanced Cell Technology group is particularly interested in improving cell survival upon in vivo transplantation and on the use of extracellular vehicles as therapeutic tools, both in their native form as well as after modulation with molecules of interest.

Publication highlights

APL Bioengineering. 2025. DOI: 10.1063/5.0251889

Molecular Therapy Nucleic Acids. 2025. DOI: 10.1016/j.omtn.2025.102498

Group leader

Hugo Fernandes

Research lines

Native and bioengineered extracellular vehicles for regenerative medicine

Nature-inspired drug delivery systems

High-throughput phenotypic screening for regenerative medicine

ADVANCED THERAPIES

Overview

35 Members
13 PhD holders
21 PhD students
1 MSc students

> 919k € Funding

The Advanced Therapies research group was created in January 2008 at the University of Coimbra. The research group aims at generating knowledge to better understand and treat age-related diseases, namely cardiovascular diseases.

The research group has two main avenues of research:

- Aging and disease modeling, and drug screening programs: to identify new therapeutic targets. A particular interest of the group is to study age-related diseases, particularly the ones related with the cardiovascular system, using in vitro human tissues created by induced pluripotent stem cells. The tissues can also be used for drug screening programs to identify new therapeutic targets.
- Nanomedicine research program: to deliver more efficient pharmacological interventions in living systems. Another interest of the group is in the development of advanced formulations for the controlled delivery of drugs to enhance tissue/organ regeneration and control aging processes.

In the coming years, the group will contribute to several fronts including the investigation of cardiac ageing; to develop new strategies to deliver efficiently anti-aging drugs to the heart; to develop new interventions to prevent or slow down vascular ageing; to develop new therapeutic formulations to reprogram aged cells into functional cells.

The group will contribute to curricular units of the PhD in Experimental Biology and Biomedicine (BEB) and PhD in Health Sciences, both at the University of Coimbra. In addition, the group will coordinate a curricular unit named Regenerative Medicine at the Integrated Master of Biomedical Engineering and in the Master of Cell and Molecular Biology.

Publication highlights

Cardiovascular Research. 2025.
DOI: 10.1093/cvr/cvaf208

Materials Today Bio. 2025.
DOI: 10.1016/j.mtbio.2025.101742

Neuro-Oncology. 2025.
DOI: 10.1093/neuonc/noae169

Molecular Therapy Nucleic Acids. 2025.
DOI: 10.1016/j.omtn.2025.102498

Advanced Healthcare Materials. 2025.
DOI: 10.1002/adhm.202404065

Group leader
Lino Ferreira

Research lines

Disease modeling and drug screening programs based on stem cell-based models

Nanomedicine program to modulate the activity of stem cells and their progenies

DATA-DRIVEN MOLECULAR DESIGN

Overview

9 Members
2 PhD holders
5 PhD students
2 MSc students

125k € Funding

The research conducted in the Data-Driven Molecular Design group is based on the integration of data science and artificial intelligence with chemistry, structural biology, and biomedicine, with a focus on developing robust and reproducible computational methodologies that generate mechanistic knowledge and accelerate biomedical discovery processes. This work has resulted in the creation of reference pipelines and tools, including SYNPRED, DELFOS, and GPCR-A17 MAAP.

The group has secured and led significant high performance computing (HPC) allocations, enabling large-scale mechanistic simulations and multi-omics artificial intelligence approaches. These activities are closely linked to participation in national and European scientific infrastructures, notably BioData.pt/ ELIXIR-Portugal and BioExcel.

In the field of innovation and knowledge translation, the group co-founded PURR.AI, a deep-tech startup operating at the interface between Artificial Intelligence and neuroscience, with the goal of translating cutting-edge scientific research into technological solutions with clinical potential and socioeconomic impact.

Publication highlights

Trends In Pharmacological Sciences. 2025. DOI: 10.1016/j.tips.2025.10.010

Journal of Neuroinflammation. 2025. DOI: 10.1186/s12974-025-03588-z

Journal of Cheminformatics. 2025. DOI: 10.1186/s13321-025-01050-z

International Journal of Biological Macromolecules. 2025. DOI: 10.1016/j.ijbiomac.2025.139880

Group leader

Irina Sousa Moreira

Research lines

Bioinformatics

Computational biology

Data science

Machine learning

Structural modeling

FUNCTIONAL GENOMICS & RNA-BASED THERAPEUTICS

Overview

5 Members
3 PhD holders
1 PhD students
1 MSc students

400k € Funding

The work of the Functional Genomics and RNA-based Therapeutics research group is focused on two main areas: the identification and molecular characterization of novel cellular factors relevant to cardiac regeneration and repair, with a particular focus on cardiac fibrosis, and the translation of this knowledge into effective RNA-based therapeutic strategies; and the development and application of high-throughput and high-content screening technologies using genome-wide siRNA, miRNA and CRISPR libraries.

- **Novel RNA-based therapeutics for cardiac regeneration and repair:** cardiovascular diseases, including myocardial infarction, are the leading cause of death globally. The main area of work of the Functional Genomics and RNA-based Therapeutics group is the identification and characterization of novel cellular factors that control regeneration and repair of cardiac tissue following injury. This is achieved through systematic and unbiased genome-wide experimental approaches, such as functional high-throughput screening (HTS) and RNA sequencing. The ultimate goal of the group is to exploit this knowledge to develop novel RNA-based therapeutic strategies enabling heart regeneration.
- **High-throughput and high-content screening using genome-wide siRNA, miRNA and CRISPR libraries:** an additional area of research of the Functional Genomics and RNA-based Therapeutics group is the development of high-throughput screening (HTS) and high-content screening (HCS) technologies and their application to different areas of biomedical research (e.g., regenerative medicine, infection biology, intracellular signaling and cancer). The state-of-the-art high-throughput screening (HTS) platform hosted by the Functional Genomics and RNA-based Therapeutics group at CNC-UC is the first platform in Portugal equipped with the adequate instrumentation, libraries and expertise to perform arrayed human and mouse genome-wide siRNA, miRNA and CRISPR screenings.

Publication highlights

Nature Communications. 2025.
DOI: 10.1038/s41467-025-66373-9

Nature Cardiovascular Research. 2025.
DOI: 10.1038/s44161-025-00623-3

Group leader

Miguel Mano

Research lines

ncRNAs in cardiovascular diseases

Cardiac repair and regeneration

Molecular determinants of cardiac fibrosis

Functional genomics screening

FUNCTIONAL PROTEOMICS IN HEALTH & DISEASE

Overview

17 Members
4 PhD holders
5 PhD students
4 MSc students
4 Other staff

700k € Funding

The research group Functional Proteomics in Health and Disease has developed advanced mass spectrometry approaches to be used in multiple biomedical questions. The approaches range from small molecule quantification, as neurotransmitters and metabolites, to proteome profiling, identification of post-translation modifications, and intact protein analysis to identify proteoforms. The questions have been mainly focused on understanding cell biology mechanisms through interactomics or proteomics screenings; identification of disease biomarkers directly from human samples or through translational research approaches; elucidation of psychotropic long-term therapy brain modulation; and identification and quantification of drugs and metabolites in health and disease.

Publication highlights

Science of The Total Environment. 2025. DOI: 10.1016/j.scitotenv.2025.180181

Bioactive Materials. 2025. DOI: 10.1016/j.bioactmat.2024.12.019

Group leader

Bruno Manadas

Research lines

Translational biomarkers and therapy for hypoxic-ischemic encephalopathy (HIE)

Biomarker research for psychiatric diseases including schizophrenia, bipolar disorder, and autism spectrum disorder

Translational research for biomarkers of neurodegenerative disorders, including Parkinson's disease and Alzheimer's disease

Elucidation of long-term psychotropic medication mechanisms

Interactomics approaches to identify new signaling pathways

IMMUNE CELL REPROGRAMMING

Overview

11 Members
4 PhD holders
6 PhD students
1 Other staff

60k € Funding

The focus of the Immune Cell Reprogramming research group is to understand the molecular determinants underlying cell reprogramming and hematopoietic specification. In humans, the multiple differentiated cell states are normally stable and inherited through cell division. Under certain conditions, cell fate can, however, be modified or reversed.

Cell reprogramming can be achieved experimentally in different ways, including nuclear transfer, cell fusion or expression of transcription factors. The emergent ability to directly reprogram somatic cells into desired hematopoietic cell-types is opening avenues to the discovery of new therapies for immune and blood diseases. Our approach focuses on hematopoietic stem cells, for their remarkable regenerative potential, and dendritic cells, as key mediators of immunity.

The research group aims to:

- understand at the molecular level how hematopoietic cellular identities are specified during development employing cellular reprogramming;
- to use this knowledge to allow the generation of patient-specific hematopoietic and immune cells for regenerative medicine and immunotherapy.

The research of the group increases the understanding of the intrinsic determinants underlying hematopoietic progenitor and effector cell developmental specification. This knowledge may allow the re-creation of these unique cell identities from any human cell.

Ultimately, this research will contribute to personalized hematopoietic regeneration by employing human programmed hematopoietic stem cells for patient-specific cell transplantation. In addition, dendritic cells reprogramming is allowing the group to develop new ways to modulate the immune response. This represents a unique opportunity to merge the field of cell reprogramming and cancer immunotherapy and may result in the development of powerful new therapeutics for cancer and other diseases resulting from a dysfunctional immune system.

Publication highlights

Immunity. 2025.
DOI: 10.1016/j.immuni.2025.08.001

Journal of Visualized Experiments. 2025. DOI: 10.3791/68739

Current Opinion Genetics & Development. 2025.
DOI: 10.1016/j.gde.2024.102300

Group leader

Carlos Filipe Pereira

Research lines

Engineering cell fates for regenerative medicine: programming blood cell types

Programming, reprogramming and developmental biology

Development of new therapies

MEDICAL MICROBIOLOGY

Overview

15 Members
6 PhD holders
5 PhD students
4 MSc students

> 527k € Funding

The main interests of the Medical Microbiology research group are centered in microbial agents that interact with humans, both as disease agents and as part of microbiotas. The agents' biological traits relevant to infection while seeking for innovative therapies are under the group's focus. To accomplish this the group uses both in vivo and in vitro infection models, human samples, and several analytical tools (e.g., immunochemistry, molecular biology, TEM, SEM).

The group assembles microbiologists, biochemists, and clinicians, allowing different approaches to the same problem. Together with permanent medical specialists collaborators (e.g., allergology, otorhinolaryngology, dermatologists, surgeons) it fosters translation between basic- and patient-oriented research.

The group keeps intramurals partnerships, with research groups of excellence, and international fruitful collaborations with research centers of excellence such as the Johns Hopkins University (USA), Food and Drug Administration (FDA, USA), Fundação Osvaldo Cruz (FIOCRUZ, Brasil).

Our research efforts are aligned with Sustainable Development Goals (SDGs) 3 (ensure healthy lives and promote well-being for all at all ages) and 4 (ensure inclusive and equitable quality education and promote lifelong learning opportunities for all). of powerful new therapeutics for cancer and other diseases resulting from a dysfunctional immune system.

Publication highlights

Nature Microbiology. 2025.
DOI: 10.1038/s41564-025-01962-4

One Health. 2025.
DOI: 10.1016/j.onehlt.2025.101160

Clinical and Experimental Medicine. 2025. DOI: 10.1007/s10238-025-01798-6

Group leader

Teresa Gonçalves

Research lines

Modulation of yeasts infection and mycobiota by the purinergic system, in elderly and obese patients, opening novel approaches to alleviate infection-related damage

The control of Fungi considered major agents of respiratory allergic and invasive diseases, namely improving asthma diagnosis and immunotherapies with Alternaria proteome-based solutions

Preventing infection: novel technologies to prevent airborne diseases; natural resources and synthetic molecules as antimicrobials/antibiofilm, an effort aligned with one of the human health priorities (established by United Nations and World Health Organization)

MEDICINAL CHEMISTRY & DRUG DISCOVERY

Overview

30 Members
8 PhD holders
13 PhD students
9 MSc students

1.5M € Funding

The aim of the research group Medicinal Chemistry and Drug Discovery is to study the medicinal chemistry of the diterpenoids, namely carnosic acid, oridonin and their derivatives, as well as triterpenoids such as celastrol, madecassic acid, and derivatives and to study the anticancer activity of these compounds.

Computer assisted drug discovery will be used to support the development of new drugs acting on ubiquitin-proteasome system with potent anticancer activity. In addition the group has also been involved in studies on pharmacophore and structure-based drug discovery for the rational design of lead compounds inhibitors of BACE1 and Glutaminyl Cyclase for Alzheimer's disease treatment.

The preparation and study of the anticancer activity of PROTACs is also one of the group's main research objectives.

The group is also devoted to exploring the medicinal chemistry of the diterpenoids, namely the resin acids and their derivatives. It identifies hit compounds to drive drug discovery campaigns, chemical probes to study biological processes and devise shorter, more-efficient semi-synthetic routes towards naturally occurring compounds. In addition, it exploits the potential of the diterpenoids in the development of bio-based antimicrobial surfaces.

Additional objectives are to understand in depth at the molecular level the mechanisms of antimicrobial resistance, their incidence and dissemination to pave ways of fighting this huge problem of the present century, namely, to overcome resistance by investigating new therapeutic alternatives and discover novel antibacterials.

Another important topic of interest is to study neglected tropical diseases caused by pathogens parasites Leishmania, Trypanossoma and Giardia lamblia, to understand host-parasite interaction and to discover potential new drugs and therapeutic strategies to treat these infectious diseases.

Publication highlights

European Journal of Clinical Microbiology & Infectious Diseases. 2025. DOI: 10.1007/s10096-025-05113-9

Journal of Chemical Education. 2025. DOI: 10.1021/acs.jchemed.4c00763

RSC Advances. 2025. DOI: 10.1039/D5RA02441b

Communications Chemistry. 2025. DOI: 10.1038/s42004-025-01598-9

Pharmaceutics. 2025. DOI: 10.3390/pharmaceutics17111380

Group leader

Jorge Salvador

Research lines

Rational design, synthesis and biological evaluation of new anticancer drugs, including PROTACs.

Discovery of new drugs assisted by computer assisted drug discovery

Design & synthesis of antimicrobial agents and materials

Molecular characterization of multidrug resistant bacteria and therapeutic strategies

New therapeutic strategies in neglected parasitic diseases

MOLECULAR BIOTECHNOLOGY & PROTEIN ENGINEERING

Overview

8 Members
4 PhD holders
3 PhD students
1 MSc students

The activities of the Molecular Biotechnology and Protein Engineering research group are focused on performing high-quality research and advanced training to obtain a better understanding of the mechanisms of disease and pathogenicity in obligate intracellular pathogens, as is the case of many *Rickettsia spp*. The group expects to contribute to the identification of new factors and/or molecular pathways that may constitute pathogen- or host-directed targets for therapeutic intervention or the development of new diagnostics.

The research of the group is grounded on interdisciplinary collaborations with an international orientation. The group has made significant contributions both in fundamental aspects of structure-function relationships of aspartic proteases as well as in exploring their biotechnological potential. Also, the group has been contributing to establish macrophage colonization as a new virulence trait in *Rickettsia*. Therefore, allying expertise in the proteolysis field with experience with SFG *Rickettsia*, its current research program aims at exploring two understudied aspects of rickettsial biology: how proteolytic pathways modulate *Rickettsia*-host cell interactions; and how mildly pathogenic Rickettsia hijack host cell function.

The group's research programs combine methodologies from cell biology, molecular biology, recombinant DNA technology, heterologous protein production, protein chemistry, enzymology, complemented with various system-wide quantitative proteomics approaches. It has a Biosafety Level 2 laboratory, with state of the art equipment for cell culture and handling of pathogenic organisms (biological safety cabinets, centrifuge safety containers), protein expression (incubators up to 12L, high capacity centrifuges, high-pressure homogenizer), protein purification (low and medium pressure chromatography, tangential filtration systems), protein characterization (HPLC, fluorimeter, spectrophotometer), and plant growth (FitoClima PLH 12000 "walk-in").

Publication highlights

RSC Medicinal Chemistry. 2025.
DOI: 10.1039/D5MD00391A

Materials Today Chemistry. 2025.
DOI: 10.1016/j.mtchem.2025.102595

Gels. 2025.
DOI: 10.3390/gels11030164

Group leader

Isaura Simões

Research lines

Understand the role of proteolysis in the context of infection, using spotted fever group rickettsiae as our working model, to identify proteases/proteolytic machineries as novel biological targets

Understand the role of macrophage permissiveness in rickettsial pathogenesis and decipher how mildly pathogenic SFG *Rickettsia* target and manipulate host cell metabolic and proteostatic responses

Decipher the role of cell-to-cell communication for the development of rickettsial infections

Develop new biotech applications based on proteases and proteases' "engineering"

MOLECULAR MICROBIOLOGY & MICROBIOME

Overview

8 Members
4 PhD holders
2 PhD students
2 MSc students

420k € Funding

The Molecular Microbiology and Microbiome group combines culture-based microbiology, genomics and functional assays to address health challenges where progress is urgently needed: infectious diseases, antimicrobial resistance (AMR), and chronic disorders in ageing populations, increasingly shaped by declining environmental quality in air, water and food.

The group develops integrated, microbiome-aware research linking environmental reservoirs, pathogen biology and host-associated ecosystems to translational solutions. A distinctive strength is the maintenance and scientific exploitation, together with CiBB platforms and partners, of unique microbial culture collections that support hypothesis-driven research and biomedical discovery:

- **Nontuberculous mycobacteria (NTM) collection:** patient and household isolates used to map exposure routes, adaptation to drinking-water systems and antimicrobial susceptibility. In parallel, the group deciphers key mycobacterial pathways to identify targets for innovative therapies.
- **Chronic-disease microbiota collection:** isolates from diabetic skin and ulcers, enabling studies of polymicrobial communities, inflammation and impaired wound healing, and the discovery of actionable microbial signatures and interaction mechanisms.
- **Extremophile collection:** isolates from diverse extreme environments, converting microbial biodiversity into biomedical and biotechnological tools, including stabilisers for enzymes/biologics, new antimicrobial leads, optogenetic components and genome-editing modules.

In parallel, the group integrates next-generation sequencing with targeted cultivation to decipher microbiome signatures in dysbiotic ecosystems relevant to neurodegenerative diseases, including neuroactive-metabolite pathways and their impact on hosts. Together, these resources form an integrated pipeline linking strain collections, genome-informed prioritisation and functional validation to accelerate biomedical discovery and resilient biotechnology.

Publication highlights

Environmental Toxicology. 2025. DOI: 10.1002/tox.24469

ACS Sustainable Chemistry & Engineering. 2025. DOI:10.1021/acssuschemeng.5c02308

Microorganisms. 2025. DOI: 10.3390/microorganisms13061259

Scientific Reports. 2025. DOI: 10.1038/s41598-025-30723-w

SPR — *Carbohydrate Chemistry*. 2025. DOI: 10.1039/9781837676101-00118

Group leader

Nuno Empadinhas

Research lines

Mycobacterial biology

Antimicrobial resistance

Drinking-water microbiota

Chronic disease microbiome

Chronic disease microbiome

RNA & INFECTION

Overview

4 Members
3 PhD holders
1 PhD students

510k € Funding

Many bacterial pathogens have evolved sophisticated strategies to invade host cells, survive intracellularly, evade immune responses, and establish persistent infections. Understanding the molecular mechanisms that govern bacterial intracellular lifestyles is therefore essential for the development of new therapeutic strategies.

The main goal of the RNA & Infection research group is to investigate the cellular and molecular mechanisms that regulate intracellular bacterial infection, persistence, and host adaptation. The group is particularly interested in understanding how bacterial pathogens interact with professional phagocytic and non-phagocytic cells, how they manipulate host cellular pathways to promote survival, and how host cells respond to intracellular infection. The group's research focuses on clinically relevant bacterial pathogens, including *Salmonella Typhimurium*, *Shigella flexneri*, and *Staphylococcus aureus*. A major area of research in the group is the identification of host non-coding RNAs, particularly microRNAs and long non-coding RNAs, that regulate and/or are regulated during bacterial infection, as well as the characterization of the molecular mechanisms underlying their function. Another major research area is the characterization of the intracellular lifestyle of *S. aureus*, including the identification of bacterial and host factors required for intracellular survival, persistence, and host cell adaptation. The group is also interested in defining how intracellular bacterial populations differ phenotypically and functionally across distinct host cell types and microenvironments.

To address these questions, the RNA & Infection group uses multidisciplinary approaches combining infection biology, cell biology, molecular microbiology, functional genomics, RNA sequencing, advanced imaging, and genetic screening strategies. The group's long-term aim is to identify novel host and bacterial determinants of intracellular infection that can be exploited for the development of innovative antimicrobial and host-directed therapies.

Publication highlight

Nature Communications. 2025.
DOI: 10.1038/s41467-025-66373-9

Group leader

Ana Eulálio

Research lines

Mechanisms regulating intracellular bacterial survival and persistence

Host-pathogen interactions in phagocytic and non-phagocytic cells

Intracellular lifestyle of *Staphylococcus aureus*

Role of ncRNAs in bacterial infection and host defence

Functional genomics and imaging approaches to study host-pathogen interactions

TUMOR MICROENVIRONMENT & TARGETED THERAPIES

Overview

20 Members
6 PhD holders
5 PhD students
5 MSc students
4 Other staff

410k € Funding

Scientific activity of the Tumor Microenvironment and Targeted Therapies research group has been focused on the design of targeted entities, namely lipid-based nanosystems for drug and nucleic acid delivery, addressing the impact on the tumor microenvironment and cancer cells, both at the cellular and molecular level. Scientific competences include formulation and characterization of lipid nanovesicles, in vitro and *in vivo* mechanistic studies, *in vitro* cytotoxicity, biodistribution, and therapeutic testing in animal models of cancer.

The goals of the group also point towards the identification and validation of target proteins overexpressed in tumors associated with clear unmet medical needs. This aims at identifying novel pathways for drug delivery to solid tumors (and beyond the liver), combined with the demonstration of their importance for the tumorigenic process. This strategy allows to establish the mechanism of action of the targeted strategies that the members of the group have been working on, either with single or drug combinations. It will ultimately overcome the challenges posed by drug resistance and metastasis, thus leading to a decrease of overall tumor burden and relapse as well, clearly benefiting cancer patients.

To further support the achievement of the referred scientific goals and increase the translational potential of the generated knowledge, the involvement of researchers from hospitals and clinicians is fostered at the early stages of the projects. This is crucial to support the identified target proteins as markers for drug targeting, namely in patients-derived samples, and validate the proposed targeting strategies.

Publication highlights

Biomedicine & Pharmacotherapy. 2025. DOI: 10.1016/j.biopha.2025.118817

International Journal of Pharmaceutics. 2025. DOI: 10.1016/j.ijpharm.2025.125973

Biomacromolecules. 2025. DOI: 10.1021/acs.biomac.5c00208

International Journal of Pharmaceutics. 2025. DOI: 10.1016/j.ijpharm.2025.125553

Group leader

João Nuno Moreira

Research lines

Identify pathways for drug delivery to solid tumors (and beyond the liver)

Engineering strategies to temporal and special delivery of drug combinations targeting different components of the tumor microenvironment

Delivery of macromolecules to solid tumors

Novel anticancer targeted strategies to boost intratumoral immune system

VECTORS, GENE & CELL THERAPY

Overview

61 Members
25 PhD holders
12 PhD students
5 MSc students
19 Other staff

7M € Funding

The Vectors, Gene and Cell Therapy research group is devoted to the creation of new effective therapies for brain diseases that can be moved from the bench to the bedside. For this, the group designs and uses technological platforms based on viral and non-viral gene transfer vectors, and induced pluripotent stem cells for the:

- establishment of models of brain disease;
- study of disease mechanisms;
- development of new molecular and stem cell, therapeutic and prophylactic approaches - for brain disorders, particularly neurodegenerative diseases, notably Machado-Joseph's disease (MJD)/ spinocerebellar ataxia type 3, as well as brain tumours.

The group results from a restructuration of the former Vectors and Gene Therapy group, and has a strong expertise in gene transfer (viral and non-viral) and stem cells for brain disease-modeling and therapy. The group's technological platforms include:

- lentiviral and adeno-associated AAV viral vectors;
- exosomes and nanoparticles targeted to the brain repair and vaccination;
- gene editing with CRISPR-Cas9;
- induced pluripotent stem cells for disease modelling;
- neural stem cell and mesenchymal stromal cells transplantation for brain repair;
- biomarker discovery from patient fluids.

Publication highlights

Trends in Molecular Medicine. 2025.
DOI: 10.1016/j.molmed.2025.06.007

Lancet Regional Health – Europe. 2025.
DOI: 10.1016/j.lanepe.2025.101339

Brain. 2025.
DOI: 10.1093/brain/awaf199

Medicinal Research Reviews. 2025.
DOI: 10.1002/med.22117

Vaccine. 2025.
DOI: 10.1016/j.vaccine.2025.127078

Group leader

Luís Pereira de Almeida

Research lines

Gene therapy for brain

Cancer and infection (vaccines)

Viral and non-viral vectors

Stem cells

HEALTHCARE CHALENGES

Triggering action on some of the most complex health issues of today. Improving health and well-being for all, UN's third Sustainable Development Goal, requires a visionary approach to tackle major challenges for healthcare globally.

Coordinator

Bárbara Gomes

Group Leader

Pedro Lopes Ferreira
João Malva
Tracey L. Weissgerber
Bárbara Gomes

Group

Health, Management and Economics
Healthy Aging Hub
Meta-research to Improve Research Practice
Palliative, End of Life and Bereavement Care

From Local to Global in Health Challenges

2025 was the first year of operation of the Healthcare Challenges area at CiBB. It was immensely gratifying to see the proposal for its creation welcomed and approved, and I take on the leadership of this area with an equal sense of responsibility. I am extremely proud of the group of researchers we have brought together, many of whom are still in the early stages of their careers but show tremendous promise.

“Researchers are the determining factor in growing the area and sustaining its future, in which we will have an impact in Portugal, Europe, and around the world”

Although it was its inaugural year, 2025 was a year of full activity for the four groups that make up CiBB’s Healthcare Challenges area. It was a year dedicated to advancing three major international projects funded by the European Comission that had begun in previous years, under our coordination. As such, 2025 marked a highly auspicious start for this area, which brings together current and highly challenging topics such as palliative care, aging, the impact of work on health, meta-research, and others.

The first of these projects is EOLinPLACE, an ERC Starting Grant launched in 2022 that focuses on places of death and where people receive care at the end of life. **Another major project is CHAngeing – Connected Hubs in Ageing: Healthy Living to Protect Cerebrovascular Function**, launched in 2023, which aims to establish a center of excellence dedicated to healthy ageing and longevity, in partnership with a leading center in Crete in this field. **The third project is EXCELScIOR, an ERA Chair project on meta-research** that is highly important for CiBB, launched in 2023.

In addition to the three groups leading these projects, the area also includes **the Health, Management and Economics group, which in 2025 published an important study on how workplace practices affect work–life balance across Europe**, with different impacts on men and women. The team analyzed data from more than 71,000 workers in 36 European countries. It is a highly interesting study that highlights the implications of work for health.

Among the achievements within the area in 2025, I would highlight those of the EXCELScIOR project, building on the European Commission Science for Policy report Promoting Reusable and Open Methods and Protocols, which was led by the Chair Team Leader of the EXCELScIOR and leader of the CIBB group on meta-research, Tracey Weissgerber.

The Palliative, End of Life and Bereavement Care group also achieved significant milestones with the International Classification of Dying Places (ICP) being endorsed by the United Nations. We are now turning our attention to its worldwide implementation. We also made progress in a particularly interesting area: bereavement support.

One of the group's researchers received the Early Researcher Award from the European Association for Palliative Care with work in this field. **We have research areas with considerable potential to distinguish us internationally.**

One of the things we enjoy doing in this area is anticipating future needs. The Palliative, End of Life and Bereavement Care group is currently working on an update of a research work closely pursued with a team at King's College London, with whom we have a very strong collaboration, to produce projections on the burden of serious health-related suffering across different regions of the world and among different age groups.

> **"Health-related needs will only continue to increase, particularly in low-income countries, but also in high-income countries"**

Bereavement-related needs follow the same trend: for every person who dies, approximately five people are affected. **Projecting future needs in our field and in healthcare in general is essential work. It would be interesting to see similar forecasting efforts in other areas, as they would help us reflect on the future growth potential of our own fields.**

In the coming years, the Healthcare Challenges area will focus on consolidating its four research groups and, potentially, creating a new one. Global Health is a field that is beginning to flourish. From epidemiology to public health, it encompasses the major health issues that cut across all regions of the world. It is an extremely challenging area when we think about the future of health, key to the delivery of equitable healthcare.

I believe that science will need new talent in the future. Young researchers are truly fundamental: new talent brings new ideas, creativity, and interdisciplinarity. It is encouraging to see interdisciplinarity receiving increasing recognition, particularly from different funding bodies.

Given my background in Psychology—a social science and a discipline quite different from those of most CiBB scientists—**I strongly believe in the value of interdisciplinarity and in examining health issues through different lenses.**

I firmly believe that science advances through outstanding research, where quality and creativity can emerge and prevail. It is important to strengthen the funding allocated to excellent bottom-up research, both among funding organizations and within the research community itself.

I also believe it is essential, especially at the early stages of researchers' careers, to encourage proactivity so that they can pursue their own ideas without boundaries or constraints, as much as possible. **Science advances above all through the boundless creativity of researchers.**

HEALTH, MANAGEMENT & ECONOMICS

Overview

38 Members
25 PhD holders
7 PhD students
6 MSc students

The Health, Management and Economics group is formed by researchers originally from the Center for Health Studies and Research of the University of Coimbra (CEISUC), developing a transdisciplinary research approach in health systems and services, focusing in particular on the Portuguese system. The group's objective is to develop research on health systems/services, to contribute to the development of the field of health economics research under four main research areas: health systems, value in health, people in health, and health trajectories, contributing to analyze outcomes resulting from links between fundamental research in metabolic, environmental, genetic and aging-related diseases, good practices and technologies supporting living and active aging, and adoption of healthy lifestyles.

The research group includes skills from economics, management, statistics, health administration, medicine, nursing, physical therapy, and psychology. It deals with the overall system governance, including the analysis of the evidence-based health policy-making, the reconciliation of economic priorities with the psychological well-being in health organizations, the assessment of equity in the access to healthcare, as well as the monitoring of audit systems. Moreover, the group handles the impact of healthcare on people, users, caregivers and healthcare providers, including their involvement, empowerment, quality of life and satisfaction. At last, it deals with health over time for individuals, public, families or communities, including technology assessment, aging, chronic diseases and end-of-life care. It is involved in scientific activities including post-graduate programs, participation in scientific national and international networks.

It also developed the Repository of Health Measurement and Assessment Instruments (RIMAS), which contains measurement instruments culturally adapted and validated in Portuguese, to be used by researchers, students and health professionals.

Publication highlights

BMC Public Health. 2025.
DOI: 10.1186/s12889-025-25935-8

Pulmonology. 2025.
DOI: 10.1080/25310429.2024.2411812

Family Process. 2025.
DOI: 10.1111/famp.70060

Health Policy. 2025.
DOI: 10.1016/j.healthpol.2025.105307

Health Policy. 2025.
DOI: 10.1016/j.healthpol.2025.105264

Group leader

Pedro Lopes Ferreira

Research lines

Health outcomes measurement

Healthcare management & social impact

Econometrics & economic evaluation

Health literacy

HEALTHY AGING HUB

Overview

The Healthy Aging Hub research group has been inspired by the European Innovation Partnership on Active and Healthy Ageing and by Ageing@Coimbra Consortium to deliver innovative knowledge transfer on ageing research and good practices to support healthy living and better health care. The key-objectives of the research group are addressed by its three inspiring questions: why do we age? How do we age? How do we support healthy living and active aging?

The mainstream topics focused by the group enclose fundamental and translational research related with the most prevalent age-related chronic conditions, including neurodegenerative diseases, musculoskeletal diseases, respiratory diseases, immunology, cardiovascular diseases, diabetes, cancer, adherence to therapy and polymedication, falls and frailty, integrated care and palliative care.

The Healthy Aging Hub has an highly interdisciplinary research team and encloses fundamental and applied research, medical, nursing and pharmaceutical care, eHealth, health literacy and citizens empowering skills. The members of the team have been founders and coordinators of Ageing@Coimbra, members of EIT Health Knowledge Innovation Community (KIC), coordinators of RESOE (North-West Iberian regional cluster) task force on Demographic Changes and Ageing, members of coordination board of the Reference Site Collaborative Network, coordinators of relevant scientific societies (eg., neuroscience, internal medicine — including geriatrics, rheumatology, forensic medicine, atherosclerosis, among others).

Group leader

João Malva

Research lines

Impact of inflammation and stem cell dynamics in physiological ageing

Common mechanisms related with inflammation and stem cell dynamics in age-related chronic diseases

Good practices and technologies supporting healthy living and active ageing

Empowerment of citizens towards the adoption of adequate health management skills and healthy lifestyles

META-RESEARCH TO IMPROVE RESEARCH PRACTICE

Overview

7 Members
6 PhD holders
1 PhD students

30k Funding

The group Meta-research to Improve Research Practice was formed from the EXCELScIOR ERA Chair team in meta-research. The research group aims to identify opportunities to improve the quality, transparency and impact of research at the University of Coimbra and beyond. Research priorities include building local and national capacity for meta-research, identifying common problems and beneficial practices in research publications through automated screening, improving the quality of methods reporting, identifying knowledge gaps to improve research impact, establishing guiding principles for responsible data reuse, and improving research assessment. Educational priorities include designing hands-on training in responsible research and open science practices and integrating them into existing training programs, establishing new advanced training offers in meta-research, including a meta-research PhD program, and organizing conferences and unconferences on meta-research. The multidisciplinary team includes members with research experience in many fields, which enhances the team's ability to collaborate with researchers throughout the university.

Publication highlights

PLOS Computational Biology. 2025. DOI: 10.1371/journal.pcbi.1013283

PLOS Computational Biology. 2025. DOI: 10.1371/journal.pcbi.1013317

BMC Medical Research Methodology. 2025. DOI: 10.1186/s12874-025-02560-y

Neurology. 2025. DOI: 10.1212/WNL.0000000000210169

Learned Publishing. 2025. DOI: 10.1002/leap.2028

Group leader

Tracey L. Weissgerber

Research lines

Rewarding early career researchers for implementing reproducible, reusable and open research practice

Building local and national capacity for meta-research

Development of automated screening tools to improve transparency, rigor and reproducibility in published research

Enhancing sharing of open and reusable methods and protocols

PALLIATIVE, END OF LIFE & BEREAVEMENT CARE

Overview

19 Members
8 PhD holders
7 PhD students
4 Other staff

60k Funding

Palliative, end of life and bereavement care is one of the most neglected and complex areas of health systems today, one that affects all humans and that can only be understood by crosscutting disciplines. Global need for this care approach is fast-growing in an ageing and changed social world with limited care resources.

Worldwide projections published in The Lancet Global Health in 2019, in which the research group Palliative, End of Life and Bereavement Care collaborated, showed the number of people dying with serious health-related suffering is set to double from 26 million in 2016 to 48 million in 2060. This includes children, adolescents and adults living and dying from complex chronic conditions. The loss of each of these persons leaves around five people grieving. Palliative, end of life and bereavement care should be accessible to all. Research is needed to help achieve this.

Our group brings together researchers and clinicians from different fields, working closely with patients and carers to act as a hub for interdisciplinary research and innovation. As an emerging research group of CiBB, our main goals are to build fresh knowledge and discover new ways of organising care, interventions and product solutions, with a view to help people live better with illness, death and bereavement, according to what is most important to them and with the best possible quality of life.

Publication highlights

Health and Place. 2025.
DOI:10.1016/j.healthplace.2025.103534

BMC Palliative Care. 2025.
DOI:10.1186/s12904-025-01705-6

Journal of Palliative Care. 2025.
DOI:10.1089/jpm.2024.0179

Palliative Medicine. 2025.
DOI:10.1177/02692163251320507

Journal of Epidemiology and Community Health. 2025.
DOI:10.1136/jech-2025-224358

Group leader

Bárbara Gomes

Research lines

Integrated care management

Physical, psychosocial and spiritual care

Patient choice for where to die

Pediatric palliative care

RESEARCHERS' REPRESENTATIVES

Postdoc Representatives

The CiBB Postdoc Representatives Committee pledges to ensure the representation of its members in the scientific council of the CiBB, work to promote and support the interests of CiBB postdoctoral researchers on scientific, professional and community levels. The committee organizes seminars, workshops, conferences, inquiries of satisfaction, informal scientific/social activities to facilitate the interaction between CiBB postdoctoral researchers and support other activities proposed by CiBB postdoctoral researchers.

CiBB Postdoctoral Researchers are all the researchers who have received a doctoral degree that belong to a research group of the CiBB R&D unit and are employed through a temporary appointment of any nature (e.g., fellowships, contracts under the law DL57/2017, fixed-term contract, among others).

2025 Initiatives:

- Meet Our Science | Monthly event for science discussion and networking (seminars from PhDs, PostDocs and PIs)
- Lunch with the Speaker | Coordinated lunches between invited CiBB speakers and CiBB members, prioritizing PhD students and postdocs
- Meet Our Job | Annual event with seminars, networking and workshops directed at doctorates interested in learning about career options beyond academia
- Meet Our Institute | Annual survey of the CiBB community to identify common difficulties, gather feedback on CiBB organization and collect suggestions for improvement, to be discussed with the CiBB coordinators
- Participation in CiBB Welcome Day

Teams

2023-2025
Cláudia Deus, Emanuel Candeias, Lisa Rodrigues, Luís Ribeiro, Raquel Boia and Rui Costa

2025-2027
Ana Carvalho, Ana I. Duarte, Ana Rita Afonso, Filipe V. Duarte, Liliana Mendonça, Liliana Santos, Sandra Anjo

RESEARCHERS' REPRESENTATIVES

PhD Students' Representatives

The CiBB PhD Students' Representatives aims to serve as the representative body of the CiBB PhD students working at the CiBB. Therefore, the team ensures the representation of its members in the scientific council of the CiBB, promotes regular communication and meetings among CiBB PhD students, and supports informal scientific and social interactions to strengthen the student community and foster a collaborative and welcoming environment.

The representatives also act as a bridge between PhD students and the CiBB leadership, ensuring that students' needs, concerns, and ideas are heard and addressed, striving to make the PhD experience at CiBB both scientifically and personally rewarding.

2025 Initiatives:

- Regular meetings with the director of CiBB
- Participation in the CiBB Welcome Day
- Representation in the Scientific Council of the institution
- Support of new PhD students
- Organization of an online meeting with CiBB PhD students to listen to their concerns
- Sharing of a mental health survey developed by the Faculty of Psychology of the University of Coimbra to explore mental health problems in the PhD students' community

Team

2025-2026
Bárbara Canijo Santos, Carolina Marques dos Santos, Caroline Veloso, Daniela Marques Mateus, Eva Ferro and João Durães

2026-2027
Ânia Rodrigues, Bárbara Canijo, Beatriz Caramelo, Diana Sousa, Emanuel Tahiri, Hugo Cardoso, Luísa Matos and Quratul in Zahara

SCIENTIFIC PLATFORMS

The scientific activities of CiBB are supported by a set of state-of-the-art scientific platforms, several of which are integrated into the National Roadmap of Research Infrastructures of Strategic Interest (RNIE) and, through these, into the corresponding European Research Infrastructures. Equipped with advanced technologies and operated by highly skilled staff, these platforms provide essential technical expertise, training, and methodological support. They play a central role in enabling cutting-edge research and in driving the development of innovative approaches and impactful scientific discoveries.

Coordinator

Luísa Cortes

Coordinator

Ana Raquel Santiago
& Joana Almeida
Matthias Futschik
Luísa Cortes
& Carlos Filipe Pereira
Conceição Egas
Miguel Mano
Bruno Manadas
Manuela Grazina
Luísa Cortes
& Henrique Girão
Paulo Oliveira
Inês Esteves Baldeiras
Maria Rosário Almeida
Rui Nobre

Platform

Animal Facility

Bioinformatics and Data Analytics
Flow Cytometry

Genoinseq
High-throughput/High-content Screening Platform
Life Sciences Mass Spectometry Laboratory
Mitochondrial Biomedicine and Theranostics Laboratory
Microscopy Platform

MitoXT
Neurochemistry Lab
Neurogenetics Lab
ViraVector

ANIMAL FACILITY

Overview

13 Members
3 External services
14 Trainees
> 10k h Usage time

The CiBB Animal Facility is a platform supporting animal experimentation of scientific and educational nature, essential for the pursuit of scientific research and technological development, in compliance with Directive 2010/63/EU and Portuguese Decree-Law 113/2013.

The main mission of the Animal Facility is to guarantee animal welfare and sanitary conditions consistent with the high standards required for excellence in research and teaching. The platform ensures animal reproduction and complete husbandry, as well as technical and scientific support for experimental procedures, available to all CiBB researchers and external entities using animal models in their projects. Currently, the CiBB Animal Facility comprises three locations at UC-Polo I, UC-Polo III, and UC-Biotech. These infrastructures mainly support experimental projects in neuroscience, immunology, cancer, and metabolic diseases, providing access to behavioural testing equipment, surgical rooms, and specialized expertise, namely breeding and housing of small rodents (rats and mice), production of embryos and litters, and technical assistance in animal experimentation procedures, including surgery.

Coordinator
Ana Raquel Santiago

Coordinator
Joana Almeida

BIOINFORMATICS & DATA ANALYTICS

Overview

2 Members
1 External service
2 Trainees
200h Usage time

The Bioinformatics and Data Analytics platform offers a comprehensive suite of services tailored for both internal and external users, enabling efficient processing and insightful analysis of biomedical data. The mission of this platform is to maximize the value of user-generated data and facilitate the knowledge discovery process. It supports scientific endeavours of all sizes, ranging from the statistical evaluation of small-scale experiments to the advanced analysis of big data using machine learning and artificial intelligence.

The platform provides expertise and support in various aspects of biomedical data analysis, including genomic sequencing, transcriptomics, proteomics and clinical data analysis. By leveraging cutting-edge computational methods and state-of-the-art data integration, it helps users uncover hidden patterns, identify potential biomarkers, and derive meaningful insights from complex datasets.

Coordinator

Matthias Futschik

FLOW CYTOMETRY

Overview

The Flow Cytometry platform provides a comprehensive range of services, including sample analysis and cell sorting, as well as access to advanced equipment, dedicated software, and specialized technical expertise for a wide variety of flow cytometry applications. The recent upgrade of the platform has expanded its capabilities to include full spectrum flow cytometry, enabling high-dimensional, multiparametric analysis with increased resolution and flexibility. Operating across two sites — UC-Polo I in Coimbra and UC-Biotech in Cantanhede — the facility is equipped with state-of-the-art cell sorters capable of isolating up to four distinct cell populations simultaneously, alongside advanced analysers for complex flow cytometric studies. This platform aims to support high-quality, cost-effective research by providing training, technical guidance, and access to cutting-edge methodologies to CiBB researchers and, by appointment, to external users.

Coordinator

Luísa Cortes

Coordinator

Carlos Filipe Pereira

GENOINSEQ

Overview

2 Members
10 External services
800h Usage time

The Next Generation Sequencing Laboratory (Genoinseq) provides differentiated services in genomics and functional genomics, through state-of-the-art next generation sequencing and bioinformatics large scale data analysis. We have a multidisciplinary team of experts in sequencing and bioinformatics, that support the users in experimental design of their projects, sequence with the most efficient and adequate approach for optimal results and help transform sequencing data into biological or clinical answers through a comprehensive set of bioinformatics tools.

The Next Generation Sequencing Unit collaborates in R&D projects with other companies or institutes and has its own R&D program aimed towards innovation in scientific and technical aspects of sequencing and data analysis. The Next Generation Sequencing Laboratory is a node of the GENOME-PT, a Research Infrastructure that integrates the National Roadmap of Research Infrastructures of Strategic Interest (RNIE).

Coordinator

Conceição Egas

HIGH-THROUGHPUT/ HIGH-CONTENT SCREENING

Overview

The High-throughput/ High-content Screening platform is equipped with state-of-the-art instrumentation to perform genome-wide loss- and gain- of-function screenings using siRNA/miRNA/CRISPR libraries, as well as screenings using large-scale libraries of chemical compounds. This fully automated platform was specifically designed to promote flexibility and can thus accommodate cell-based screenings using diversified cell models that address a wide range of biological questions. The screening platform is rendered available to researchers within the CiBB ecosystem as well as to extra-mural investigators, fostering scientific collaborations.

The screening platform is integrated into the PT — OPENSCREEN consortium, part of the National Roadmap of Research Infrastructures of Strategic Interest (RNIE), as well as the European Research Infrastructure Consortium EU — OPENSCREEEN, and the AccelBio Collaborative Laboratory. In 2022, the platform was recognized as a Partner Site (Specialised Screening site) of the European Research Infrastructure Consortium EU — OPENSCREEEN.

Coordinator

Miguel Mano

LIFE SCIENCES MASS SPECTROMETRY LABORATORY

Overview

2 Members
20 Trainees

Coordinator
Bruno Manadas

The Mass Spectrometry Laboratory is a platform that provides advanced mass spectrometry approaches to resolve multiple life sciences related questions, ranging from targeted small molecule quantification to intact protein analysis, and with a major focus on large scale quantitative proteomics. The facility is specialized in the identification and quantification of proteins from complex samples, identification of post-translational modifications, and identification and quantification of metabolites. It is mainly focused on running R&D projects with partners and collaborators (from CiBB, Biocant, other R&D institutes and private companies). The team is also actively involved in training, through Masters and PhD courses at the University of Coimbra, namely with the Chemistry Department, the Life Sciences Department, the Faculty of Medicine and CNC-UC, among others.

The Mass Spectrometry Laboratory is part of the RNEM — Portuguese Mass Spectrometry Network that integrates the National Roadmap of Research Infrastructures of Strategic Interest (RNIE), and a member of the European Research Infrastructure INSTRUCT.

MITOCHONDRIAL BIOMEDICINE & THERANOSTICS

Overview

3 Members
84 External services
5 Trainees
> 3.5k h Usage time

Coordinator
Manuela Grazina

The Mitochondrial Biomedicine and Theranostics platform (LBioMiT) provides diagnostic services and biomarker analysis for diseases related to energy production deficits.
The mission of this platform is to provide a range of specialized services, with a focus on diagnosis and reverse translational research in genetic biochemistry (particularly mitochondrial cytopathies) and precision medicine testing (pharmacogenomics/theranostics), with LBioMiT having developed some pioneering analytical tests in Portugal, in addition to unique and multidisciplinary scientific research.

MICROSCOPY PLATFORM

Overview

6 Members
2 External services
105 Trainees
> 14k h Usage time

The CiBB Microscopy platform aims to facilitate science by providing open access to state-of-the-art microscopes supported by highly skilled staff. The Microscopy platform brings together the MICC and iLAB facilities supporting both light and electron microscopy imaging.

The CiBB Microscopy platform offers a wide range of solutions including widefield and confocal microscopes, slide scanning, TEM and SEM microscopes and laser catapult microdissection, together with sample preparation support for all applications. In addition, the Microscopy platform supports image analysis by providing both expertise and dedicated infrastructure.

The MICC and iLAB platforms are nodes of the Portuguese Platform of BioImaging — PPBI, an infrastructure of the National Roadmap of Research Infrastructures of Strategic Interest (RNIE), which is part of the ERIC — EuroBioImaging.

Coordinator
Luísa Cortes

Coordinator
Henrique Girão

MICC

iLAB

MITOXT

Overview

3 Members
1 External services
20h Usage time

Coordinator

Paulo Oliveira

The MitoXT laboratory is a platform that analyses the toxicity and safety of different classes of compounds using in situ mitochondrial function as a highly reliable and accurate biosensor. This toxicological assessment provides certified analysis of mitochondrial function through the Seahorse XFe96 extracellular flux analyser, complemented by additional assays that together deliver a comprehensive picture of cellular mitochondrial metabolism.

In addition, MitoXT platform offers support to research groups and industry partners in validating the use of specific molecules or biological extracts as cellular or mitochondrial protectors capable of counteracting oxidative stress or other stressors, thereby paving the way for their potential therapeutic application. MitoXT also performs detailed characterisation of mitochondrial function in cells from various origins, including patient-derived cells from individuals with metabolic disorders (such as primary mitochondrial diseases) as well as cells from animal models. The platform is furthermore equipped with a mid-range infrared reader (MIRA Reader from Clade), unique in Portugal, which enables the acquisition of high-quality infrared spectra from liquid samples.

NEUROCHEMISTRY LABORATORY

Overview

Coordinator

Inês Esteves Baldeiras

The Neurochemistry Laboratory is a platform that identifies and validates body fluid biomarkers for diagnosis and follow-up of neurodegenerative diseases.
Long-term collaboration with the Department of Neurology of Coimbra Local Health Unit has resulted in the translation of cerebrospinal fluid (CSF) biomarkers for Alzheimer's Disease into clinical practice and a rapid, short turnaround time due to fully automated immunoassays for the quantification of these biomarkers. Standardization of pre-analytical and analytical procedures has been achieved through joint involvement in research projects and quality control programs over the 10 years.

Given the urgent need for less invasive biomarkers, the ultrasensitive immunoassay platform Single Molecule Array — SiMoA is used to quantify brain-derived proteins in the blood. Neurodegenerative blood markers allow the screening of a wider population at an early disease stage and the assessment of disease progression and the efficacy of the therapeutic regimens. The laboratory is currently evaluating the potential of blood-based markers for risk of cognitive decline and dementia. The Neurochemistry Laboratory is in the framework of the Portuguese Epidemiologic Surveillance Program for Human Prion Diseases (National Reference Laboratory for CSF analysis) and is currently the main national laboratory for dementia CSF studies.

NEUROGENETICS LABORATORY

Overview

3 Members
175 External services
6 Trainees

Coordinator
Maria Rosário Almeida

The Neurogenetics Laboratory is a platform that maintained in 2025 its commitment to providing high-quality molecular diagnostics for different genetically mediated neurological disorders, including early-onset dementias, Parkinson's disease, amyotrophic lateral sclerosis, cerebrovascular diseases, and repeat expansion disorders such as Huntington disease, Friedreich ataxia, and Machado-Joseph disease. This work contributed not only to achieving early and accurate genetic diagnoses, an essential step for the effective follow-up of these conditions, but also to providing predictive genetic testing to high-risk family members within the framework of genetic counselling at the Medical Genetics Unit of the Pediatric Hospital in Coimbra. A key strength of the laboratory is its close collaboration with clinicians, including regular discussions of complex cases and molecular findings, improving patient care.

Notably, there was a marked increase in diagnostic and predictive test requests from neurologists and clinical geneticists, reflecting the growing integration of molecular genetics into neurological practice and patient care. Despite the increased workload, the laboratory maintained high diagnostic performance while optimizing workflows. This enhanced its impact on healthcare organization and reinforced the Neurogenetics Laboratory as a key contributor to improved patient care in central Portugal.

VIRAVECTOR

Overview

7 Members
10 External services
9 Trainees

Coordinator
Rui Nobre

ViraVector (VV) is a national research infrastructure that provides high-quality viral vectors, specialized technical services, and scientific expertise to support biomedical and translational research. Based in BSL-2 facilities, VV produces research-grade AAV and lentiviral vectors and offers comprehensive support in vector design, optimization, and gene transfer applications in both in vitro and in vivo experimental settings, as well as related biotechnology services.

VV plays a key role in advancing gene therapy and advanced therapy medicinal product (ATMP) research by supporting academic, clinical, and industrial stakeholders. The platform contributes to national and international collaborative projects, provides access to specialized technologies and training, and promotes the dissemination of best practices in viral vector production, biosafety, and gene delivery. Through its services and expertise, VV strengthens research capacity, fosters innovation, and contributes to high-impact scientific outputs in the field of advanced therapies.

In 2025, VV supported 38 unique users and research activities corresponding to 16.78 full-time equivalent researchers (FTEs/ETIs) from both internal and external institutions.

R&I SUPPORT

Powering research, accelerating impact.

CiBB's R&I performance is powered by several proximity offices and platforms that support the full research and innovation lifecycle, from the first spark of an idea to its real-world impact. They are the connective tissue between researchers, funders, partners and society, devoted to help great science go further, faster.

Coordinator

Elsa Henriques

Coordinator

Nuno Empadinhas
Susana Alarico
Elsa Henriques
Elsa Henriques
Sara Varela Amaral
Catarina Cunha-Santos

R&I Unit

Advanced Studies & Career Development
GreenLabs
Research Funding & Management
Open Science
Science Communication
Technology Transfer

ADVANCED STUDIES & CAREER DEVELOPMENT

Overview

14 Members

CiBB is deeply committed to postgraduate multidisciplinary education within the University of Coimbra. The University boasts a rich heritage in biomedical education, dating back to the inception of the Advanced Studies in the late 1970s, which have since evolved into contemporary PhD and Master Programs. Within this educational landscape, CiBB researchers play an integral role in shaping the next generation of researchers and scholars, clinicians, entrepreneurs, scientific administrators, and science communicators. The CiBB Advanced Studies and Career Development Office plays a pivotal role in fulfilling this commitment by undertaking a series of crucial functions.

Aims

Coordination and strategic development of Master's and Doctoral Programmes. Coordination, quality assurance and strategic alignment of CiBB-associated MSc and PhD Programmes and their advanced training activities

Advanced non-degree training in Biomedicine, Biotechnology and related life sciences. Planning and oversight of flexible, high-quality non-degree conferring training opportunities in areas aligned with CiBB's scientific scope

Integration of transversal, professional and innovation-oriented skills. Incorporation of cross-cutting competences, including ethics, science communication, research management, interdisciplinary collaboration, career development, and knowledge and technology transfer

Mental health, wellbeing and researcher support. Implementation of regular workshops, mentorship and support initiatives aimed at promoting mental health, wellbeing and professional development among students and early-career researchers

Institutional liaison and external academic engagement. Articulation with the University of Coimbra and support for external students seeking secondments and other advanced training opportunities at CiBB

Coordinator

Nuno Empadinhas

CiBB researchers are involved in 10 PhD Programs and 9 MSc Programs, plus 1 EU-funded MSCA Doctoral Network

10 PhD Programs

PDBEB — PhD Program in Experimental Biology and Biomedicine
idpIN — International Doctoral Program in Integrative Neurosciences
PhDHS — PhD Program in Health Sciences
PhD in Pharmaceutical Sciences
PhD in Biosciences
PhD Programme in Sport Sciences
PhD Programme in Psychology
Inter-University Doctoral Program in Aging and Chronic Diseases
PhD Programme in Informatics Engineering
PhD Programme in Chemical Engineering

9 MSc Programs

Master in Cellular and Molecular Biology
Master in Biomedical Research
Master in Biochemistry
Master in Microbiology and Microbial Biotechnology
Master in Pharmaceutical Biotechnology
Master in Biomedical Engineering
Master in Design & Multimedia
Integrated Master's in Pharmaceutical Sciences
Integrated Master's degree in Medicine

1 MSCA Doctoral Network

EU MSCA Doctoral Network IGNITION

GREEN LABS

Overview

56 Members
12 Green core team
44 Greenkeepers

2216 Coolers
210 kg of Styrofoam
371 kg of Plastic lab

CiBB is actively involved in an initiative called Green Labs, which promotes the implementation of sustainable daily practices in laboratories, aiming to reduce carbon footprint and energy consumption, and thereby mitigate the environmental impact of scientific research.

“Green Labs — refers to any group, activity or initiative focused on helping laboratories reduce their ecological footprint while maintaining high quality and safety standards”, as defined by the Sustainable European Laboratories Networks (SELs).
On March 23, 2022, CIBB embraced this initiative, leading to the creation of GreenLabsCiBB (GLCiBB). The Institution joined the Green Labs Portugal Network of research laboratories, which became a member of SELs on April 21, 2022.

The mission of GLCiBB has been to identify solutions and implement initiatives through improved laboratory management, equipment maintenance, and the optimization of material use. This includes reducing, reusing, and recycling materials and waste generated daily, with the additional goal of achieving short-term financial returns from these investments.

This initiative involves students, technicians, researchers and professors united by a shared commitment to protecting the environment and biodiversity, and thereby our health.
Within the institution, a network of volunteers composed of a Green Core Team and GreenKeepers has been established to support the implementation of sustainable practices and to promote ecological solutions and best practices across existing infrastructures.

Overall, in addition to redefining the way science is conducted, it is important to improve knowledge of sustainable development and to promote changes in mindsets and social behavior, in line with European guidelines for environmental sustainability.

Coordinator

Susana Alarico

Aims

Align research practices with sustainability principles to reduce carbon footprint and energy consumption

Optimize the use of equipment and materials through efficient management, maintenance, and circular practices (reduce, reuse, recycle)

Encourage resource efficiency and cost-effectiveness, ensuring that sustainability initiatives also deliver economic benefits

Improve dissemination of sustainability efforts to promote a culture of environmental responsibility

RESEARCH FUNDING & MANAGEMENT

Overview

14 Members

Turning research ambition into funded reality by enhancing the capacity of CiBB and its researchers to attract and manage competitive funding, thus ensuring the sustainable development and growth of their R&I activities and initiatives.

Aims

Motivating scientists to apply for the most appropriate funding opportunities

Actively educating scientists on the application process(es)

Ensuring that they build the strongest possible proposals

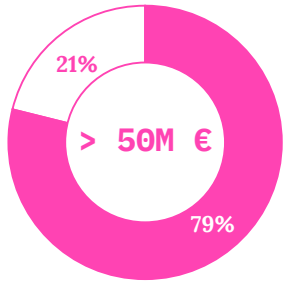
Handling the added burden of administration requirements, so that researchers focus on solving the important scientific and social challenges ahead

Coordinator

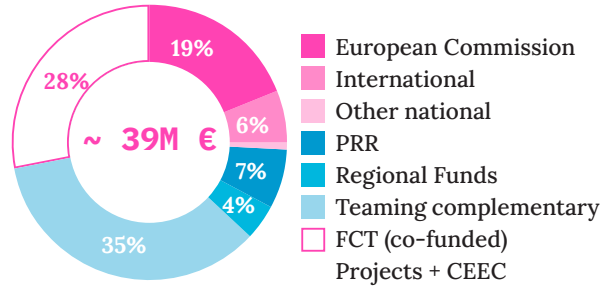
Elsa Henriques

Total Funding

> 50M € in initiated projects, including **28.9M €** approved in 2025



~ 39M € in R&I Projects



Funders

Most 2025 investment comes from research(er)-driven competitive projects from multiple funding sources, including:

Public Entities
European Commission
Ciência Viva
COMPETE|CENTRO (2030)
FCT
PRR

Private Entities
AFM-Téléthon
Federation of European Biochemical Society (FEBS)
Floriani Foundation
Fundación “La Caixa”
Fundación Mapfre
Fundação BIAL
Hovione
National Cancer Hub (NHC-PT)
Núcleo Regional do Centro da Liga Portuguesa Contra o Cancro (NRC.LPCC)
Parkinson’s and Movement Disorder Foundation (PMDF)
Sanofi
Servier
Sociedade Portuguesa de Bioquímica (SPB)
Sociedade Portuguesa de Penumologia (SPP)
Society of Toxicology (SOT)
Wellcome Trust

Funding highlights

GCure (HE ID 101186929): CiBB-UC as Coordinator | Total budget: 2 500 000€

GeneH (HE ID 101186939): CiBB-UC as Coordinator | Total budget: 4 885 375€ (1 793 286€ to UC)

UNCAN-Connect (HE ID 101215206): CiBB-UC as Partner | Total budget: 29 935 702€ (509 629€ to UC)

LIGHTCURE (HE ID 101080327): CiBB-UC as Partner | Total budget: 8 182 057€ (547 895€ to UC)

IGNITION (HE ID 101227384): CiBB-UC as Partner | Total budget: 3 743 946€ (558 891€ to UC)

SocialReward (La Caixa HR25-00456): CiBB-UC as Coordinator | Total budget: 999 930€ (699 223€ to UC)

intraSTAPH (La Caixa HR25-00467): CiBB-UC as Coordinator | Total budget: 473.903€

RESET_BONE_AGEING_2 (COMPETE2030-FEDER-0117500): CiBB-UC as Partner | Total budget: 1 255 940€ (422 370€ to UC)

SAFETILES (CENTRO2030-FEDER-01436000): CiBB-UC as Partner | Total budget: 1 027 160€ (211 894€ to UC)

PREMIUMALGAE (COMPETE2030-FEDER-02185500) : CiBB-UC as Partner | Total budget: 1 634 123€ (179 407€ to UC)

CuidIn 2.0 (CENTRO2030-FSE+-02332800) CiBB-CEISUC as Coordinator | Total budget: 500 000€ (400 000€ to CEISUC)

OPEN SCIENCE

Overview

7 Members

A platform that supports every step of the data and open science journey by bringing together the tools, services, resources and expertise needed to manage research data and outputs across their full lifecycle. It streamlines adherence to open and responsible science best practices, ensuring compliance to open science policies from funders, the EU and CiBB.

Aims

To make scientific research more accessible, transparent, and efficient by promoting the open sharing of publications, data, and other research outputs (models, algorithms, software, protocols, workflows, didactic materials, etc).

In particular:

- Promoting open access and data sharing, encouraging the publication of research in open-access formats and ensuring research data follows FAIR principles (Findable, Accessible, Interoperable, Reusable)
- Shifting research practices towards openness, collaboration, and transparency to improve research quality and reproducibility
- Increasing the visibility of research, fostering trust in scientific results, and enhancing accountability
- Fostering new evaluation methods that value open practices and recognize diverse contributions to science

Coordinator

Elsa Henriques

SCIENCE COMMUNICATION

Overview

12 Members

Public Engagement in Science:
> 12.5k People
> 400 Researchers
> 25 Collaborations

Media:
> 690 News
> 2M € Advertising Value
> 12.5M Audiences
> 37k Followers on social networks

Science communication is a key hallmark of CiBB's mission and an important driver of impact. As scientific and societal challenges grow in complexity, the Science Communication team designs innovative engagement strategies that connect research with people's lives.

This unit fosters meaningful dialogue between scientists and diverse communities, ensuring transparency, accountability, and relevance. Its work combines dissemination, public engagement, and art & science approaches to translate scientific knowledge into accessible insights, empowering citizens to make informed decisions and engage critically with science. By promoting scientific culture, literacy, and participation, the Science Communication team contributes to a more informed, engaged, and resilient society. At the same time, the team equips and inspires researchers to communicate their work effectively, strengthening the role of science in public life.

Aims

Foster scientific culture and strengthen active scientific citizenship

Ensure transparency and reinforce public accountability in research

Disseminate scientific knowledge in accessible, engaging, and relevant ways

Promote scientific literacy to empower citizens to address societal challenges

Enable meaningful public participation and co-creation in the scientific process

Coordinator

Sara Varela Amaral

National & International Initiatives

Brain Awareness Week
Children's Day
Ciência Viva Summer Internships
Coimbra Gym Fest
Conversas Improváveis
Encephalitis Day
European Researchers' Night
Fórum Nacional de Clubes Ciência Viva
International Day of Women and Girls in Science
Oeiras Valley Science Festival
Pic Nic com Saúde
Pontos nos iiis
PubhD Coimbra
Rare Disease Day
Science and Technology Week
World Obesity Day
World Sleep Day
World Tuberculosis Day

TECHNOLOGY TRANSFER

Overview

5 Members

Technology Transfer team works to make the most positive impact using the excellence of our research, graduate training, and specialized services, while enabling further scientific and technological development towards the UN Goal 3: “ensure healthy lives and promote well-being for all ages”.

The unit helps CiBB to foster socioeconomic development by transforming the scientific and technological knowledge developed in its laboratories into answers to major societal challenges in healthcare.

Aims

Assure the practical use of the scientific and technological advances by the general public and research community

Create qualified jobs

Promote the recognition and reputation of CNC-UC

Generate revenue for funding further research

Stimulate the socio-economic development of Portugal, especially the CENTRO region

Coordinator

Catarina Cunha-Santos

Activity

9 New IP families
32 Active IP families
> 890k € Total funding in academia-industry collaboration
1 Licensing agreement
5 IP Concessions
> 26k € Projects TT
> 230k € I&D projects with TTO team
8 Training events for researchers
9 Active Spin Offs

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CiBB meeting 2025

December 18, 2025
Oliveira do Bairro, Portugal


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BIOMEDICINE
AND BIOTECHNOLOGY


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AND CELL BIOLOGY
UNIVERSITY OF COIMBRA
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