
2024

Champalimaud Research Annual Report 2024

Foreword

CR Directors
Celso Matos, Champalimaud Experimental Clinical Research Programme
Joe Paton, Champalimaud Neuroscience Programme

Champalimaud Research (CR) continued to deliver on its mission of advancing science that serves society. Across our three research programmes – Experimental Clinical Research, Neuroscience, and Physiology and Cancer – this was another year marked by discovery, growth, and collaboration.

One theme that characterises progress in 2024 is our continued effort to connect CR's world-recognised fundamental discovery science to translational and clinical research and clinical care. In Neuroscience, this has meant drawing clinical units with interests in behavioural dimensions of medicine and/or shared technological goals closer to the Neuroscience Programme by involving their members in collaborative grants, social events, graduate programmes, and plans for future expansion of clinical neuroscience.

The integration of translational researchers focused on pancreatic cancer within the Botton-Champalimaud Pancreatic Cancer Centre has sparked plans to establish cutting-edge multi-omics capabilities at the Champalimaud Foundation to serve the entire research and clinical communities, as well as to strengthen our in-house scientific computing infrastructure.

At the core of our strategy are two broad thematic lines: intersystems biology in health and disease, and an integrative, whole-brain understanding of behaviour. These lines reflect our commitment to bridging foundational science with real-world impact, and to fostering synergies between disciplines, from computation to clinical application.

Our annual retreat, held in May under the theme The *Rhythms of Life*, brought together 244 members of the CR community to reflect on the shared tempo of our scientific pursuits. In addition to reinforcing connections across programmes and career stages, the retreat provided a platform to launch new forums for discussing how to strengthen our technical capabilities, improve internal processes, and support diverse career paths. One such initiative, CR Ignite, was introduced as a new channel to turn innovative ideas into actionable improvements to our scientific environment.

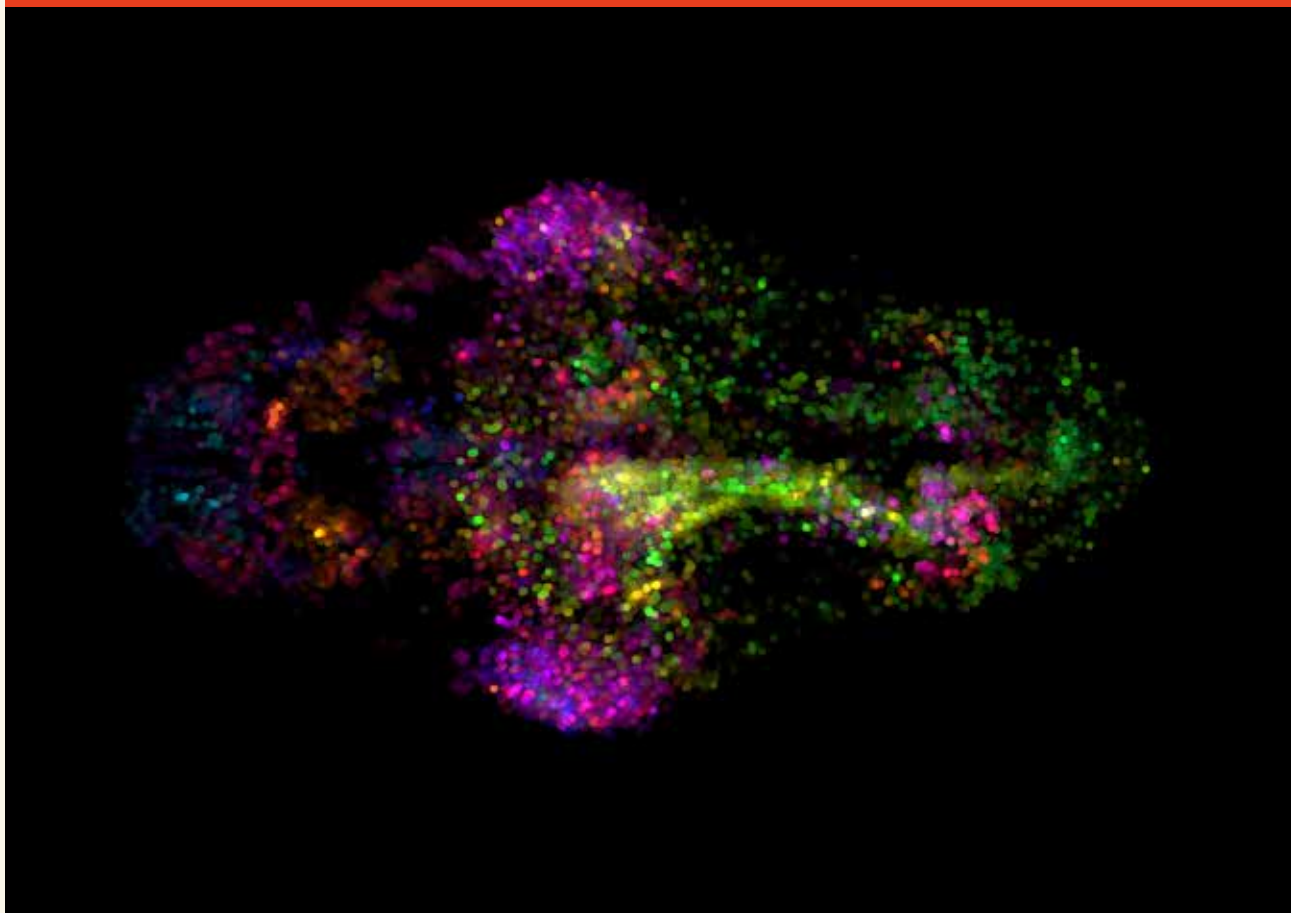
Scientific exchange flourished throughout the year, including at the 2024 CR Symposium in October, *The Ecology of Cancer: Understanding and Targeting Cancer-host Interactions*. The three-day event drew nearly 300 participants and featured talks by leading researchers, clinicians, and patient advocates, highlighting new perspectives on how cancer arises and progresses within the broader context of the organism. With 27 invited speakers, selected talks, poster sessions and editorial participation, the symposium served as a key forum for advancing research into the dynamic interplay between tumours and their host environments – an area increasingly recognised as central to the future of cancer therapy.

Innovation at the interface of science, technology and society also continued through our third edition of Metamersion, *Healing Algorithms*. This immersive public exhibition explored how digital therapeutics, computational neuroscience, and multimedia art can converge to deepen our understanding of the human mind and body. Organised as part of our efforts to establish the new Neurotechnology Warehouse, the event invited the public to interact with AI-based prototypes and participate in performances, discussions and virtual experiences that reveal how science and art together can shape the future of health.

The Foundation also hosted two major symposia in 2024 that expanded our engagement with both clinical and public audiences. The *Paediatric Cancer Symposium* gathered experts in early-age cancers to explore emerging knowledge on tumour initiation, metastasis, and therapy response, while offering a collaborative environment for basic and clinical researchers.

Later in the year, the *International Congress on Neurodegenerative Diseases* – co-organised with Fundación CIEN and Fundación Reina Sofía – brought together researchers and representatives of associations from around the world to share advances in the understanding and treatment of Alzheimer's and related disorders. The three-day event, featuring sessions on basic, clinical and translational research, emphasised the urgent societal need for global solutions to the growing burden of neurodegenerative disease.

As we look to the future, we remain committed to nurturing a research environment that values excellence, creativity and collaboration across disciplines. The achievements of 2024 are the result of the collective efforts of our community – from students and staff to investigators and collaborators – whose dedication continues to drive the mission of CR. We are proud of what we have accomplished together, look forward to building on this momentum in the years to come, and hope you enjoy the pages that follow.



Champalimaud Foundation

Leonor Beleza, President
João Silveira-Botelho, Vice-president

Champalimaud Research (CR) was launched in 2007 with around a dozen people united by an ambition to conduct pioneering neuroscience research. Since those early days, CR has evolved into a dynamic, multidisciplinary community of over 500 researchers working together with close to 600 health professionals to advance cancer and neuroscience research.

Originally conceived as a basic research programme, CR has, over the past 18 years, transformed into a model of fusion research – a collaborative approach in which scientists and clinicians work side by side in integrated teams. This unique structure allows us to navigate complexity, drive innovation, and align around shared goals. Most importantly, it brings our scientific work closer to the patients we serve, reflecting our deep belief that science should be at the service of humanity.

In the nearly two decades since our scientific work began, CR has gone from strength to strength, earning wide recognition for its achievements and for securing increasing levels of funding through internationally competitive grants.

While we take pride in how far we have come, our focus remains firmly on the future. The years ahead present both extraordinary opportunities and significant challenges. Artificial Intelligence is already reshaping the frontiers of science and healthcare, and we are committed to being at the forefront of this transformation. Every day, we are learning how best to harness these new tools – developed both within our own walls and beyond – and how to deploy them to improve lives. Our goal remains clear: to turn technological and scientific advances into tangible benefits for those in need.

In these times, bridging the gap between science and society is more important than ever. It is crucial that we help people understand the value of research and the vital work being carried out on their behalf. The relationship between science and humanity is not peripheral – it is central to the world we live in. And at the heart of this relationship are the scientists themselves.

We would like to take this opportunity to thank our Scientific Advisory Board (SAB) for the fundamental role they play in helping us achieve and maintain the excellence we strive for. Without their exceptional guidance and support, much of what we aspire to would not be possible. We thank each SAB member for sharing their expertise with us as we travel this road together.

As we look back on the last 18 years, we are also ready to meet the next 18 with the same energy, vision and dedication that has brought us success so far. And when we look back 18 years from now, we hope to feel as proud as we do today.

Champalimaud Foundation (CF)

Structure

Botton-Champalimaud Pancreatic Cancer Centre

Champalimaud Clinical Centre (CCC)

Champalimaud Research (CR)

Neurotechnology Warehouse

Ombudsperson

Scientific and Technological Platforms

Advanced Biolmaging and Biooptics Experimental
Biophotonics
Fish
Flow Cytometry
Fly
Glass Wash and Media Preparation
Hardware and Software
Histopathology
Molecular and Transgenic Tools
Multimedia
Rodent

CR Support Units

Communication, Events and Outreach
Graduate Programme Office
Health and Science
HR and Fellows Support Office
Lab Administration
Operations
Post-Award
Strategic Research Development

Direction Team

Experimental Clinical Research Groups

Cancer Development and Innate Immune Evasion
Computational Clinical Imaging
Immunotherapy / ImmunoSurgery
Molecular and Experimental Pathology
Myeloma Lymphoma Research
Neural Circuits Dysfunction
Neuropsychiatry
Preclinical MRI
Radiopharmacology
Ocular Low-cost Gene Therapy

Physiology and Cancer Groups

Cancer Dormancy and Immunity
Cancer and Stem Cell Biology
Immunophysiology
Immunoregulation
Stem Cells and Regeneration
Systems Oncology
Tissue Immunity

Education

Direction
Coordination
Teaching Lab
Education and Courses

Neuroscience Groups

Behaviour and Metabolism
Behavioural Neuroscience
Circuit Dynamics and Computation
Cortical Circuits
Learning
Mathematics of Behaviour and Intelligence
Natural Intelligence
Neural Circuits and Behaviour
Neural Dynamics
Neuroethology
Sensorimotor Integration
Systems Neuroscience
Theoretical Neuroscience
Vision to Action

Research Associates

Computational Cognitive Decision Science
Development of Neural Circuits
Innate Behaviour
Neural Circuits for Visuomotor Behaviour

Adjunct and Visiting Scientists

Cognitive-Motor Interface
Social Neuro Endocrinology

Graduate Programme SAB *

CF SAB *

* The Scientific Advisory Board (SAB) consists of external scientists who provide helpful guidance to CR Programmes and Research Groups

Neurotechnology Warehouse

The Neurotechnology Warehouse is a new multidisciplinary space where researchers, clinicians, engineers, creatives, and entrepreneurs interact to improve health through behaviour and technology, with an initial focus on neurological and neuropsychiatric disorders. It reinforces and builds on the world-class fundamental neuroscience research established at the Champalimaud Foundation (CF) over the past two decades to create a pipeline that runs from curiosity to cures. The goal is to harness disruptive technologies – including generative AI, motion capture, immersive exergaming, VR/AR, and robotics – to shape the future of healthcare.

To realise this vision, we are assembling a diverse team of professionals. Open-minded clinicians from a variety of medical disciplines will be essential, both to integrate behavioural interventions into clinical care and to help shape their development. Data scientists, AI researchers, and computational experts will work with longitudinal, multimodal patient data – from wearables, imaging, medical records, and molecular analyses – to inform and monitor treatment strategies. We will also establish a new educational programme in human neuroscience and behaviour, led by newly recruited faculty and drawing on CF's strong foundation in fundamental neuroscience to bridge discovery with real-world application.

CF has always aspired to push the boundaries of our understanding by supporting research and medicine side by side for the benefit of society. The Neurotechnology Warehouse represents nothing less than an opportunity to revolutionise medicine around those same pillars – leveraging world-class behavioural neuroscience and technology to create a new arm of medicine, complementary to and integrated with existing approaches.

↗

Psychoactive Surface interactive installation, where human motion (tracked via markers on the dancers' backs) and music are coupled with generative visual AI algorithms. Human and AI systems engage in a feedback loop, co-creating audio-visual dreamscapes.

Directors Joe Paton, John Krakauer
Programme Manager Catarina Pimentel
Innovation Manager Nina Patrick
Strategic Research Development Joana Lamego
Staff Scientists Eric Lacosse, Filipe Rodrigues, Immersive AI Systems group (Alexander Loktyushin, Fatemeh Molaei, Johannes Stelzer, Niklas Fricke)

Highlights

The year kicked off with the workshop *Interactive AI Systems for Digital Therapeutics*, held in January. Spanning three half-day sessions, this event brought together scientists, engineers, clinicians, entrepreneurs, and artists to exchange ideas and collaborate across the domains of science, technology, healthcare and art. Later, in April, a second workshop focused on *Data Challenges for Next-Gen Digital Therapeutics Development*. This gathering sparked important dialogue around shaping data collection and processing practices for the development of new digital therapeutic approaches.

Alongside these two workshops, the first quarter of 2024 also marked the start of the Warehouse's renovation, creating the infrastructure needed to host researchers and their projects.

Spring saw the return of Metamersion for its third incarnation, this time under the title *Healing Algorithms*. The immersive exhibition showcased prototype experiences and artworks based on fundamental research conducted at the Neurotechnology Warehouse, incorporating generative AI, VR and other cutting-edge technologies.

On 19th October, promoting Portugal's unique role in implementing the European AI Act, CF hosted the *Bridge_AI* conference. The event featured expert discussions on AI policy and concrete recommendations for both local and international stakeholders. During the conference, the Bridge_AI consortium released policy guidelines from five specialised working groups. Two of these – *WG2 (AI Ethics in Regulatory Processes)* and *WG4 (AI Advanced Training and Literacy)* – were led by CF researchers Razvan Sandru and Joe Paton, respectively.

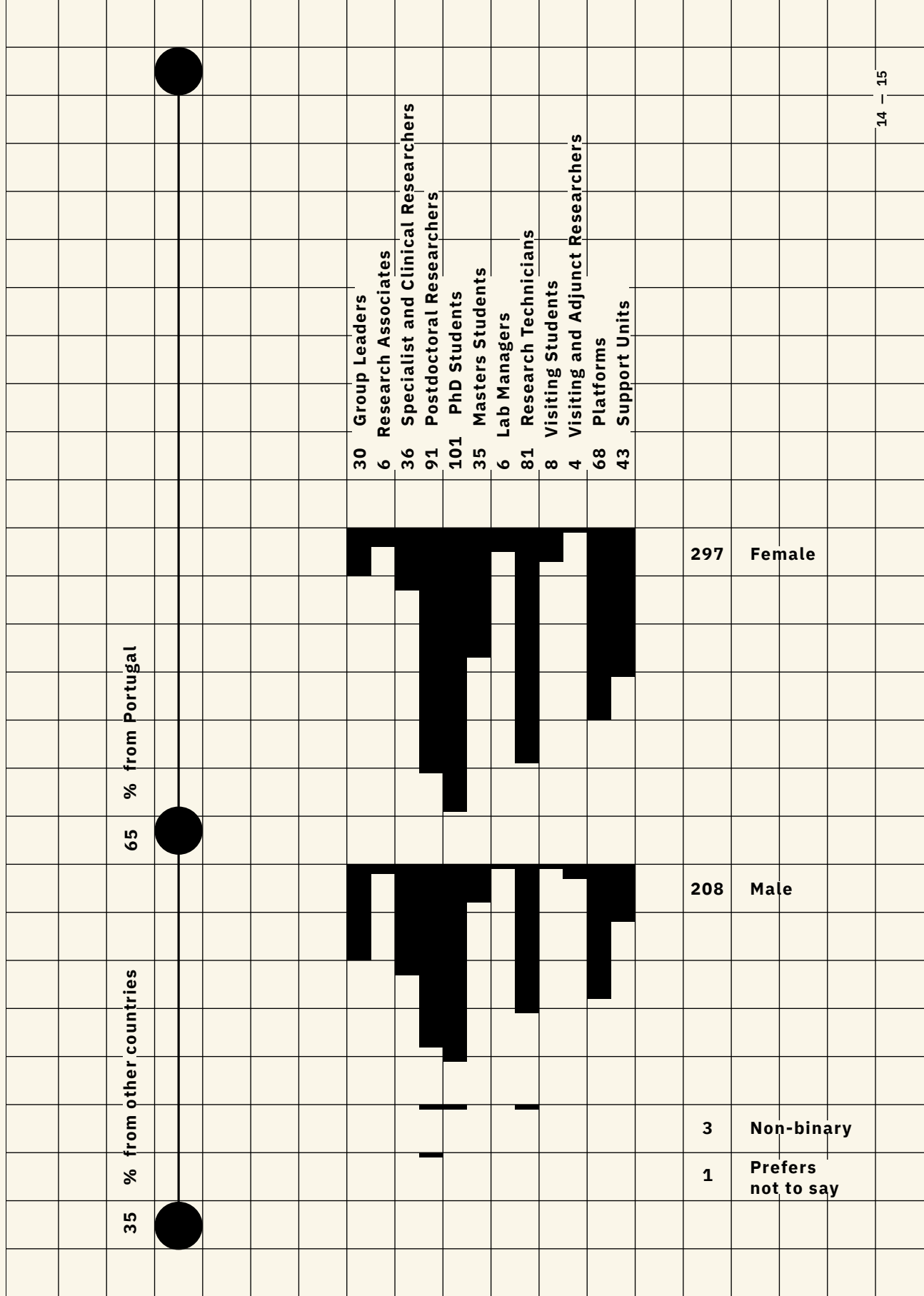
As this series of events shows, 2024 was an exciting prelude to what lies ahead in 2025, when scientific, medical and technology teams will move into the Warehouse and collaborative projects with the broader Lisbon community will begin in earnest.

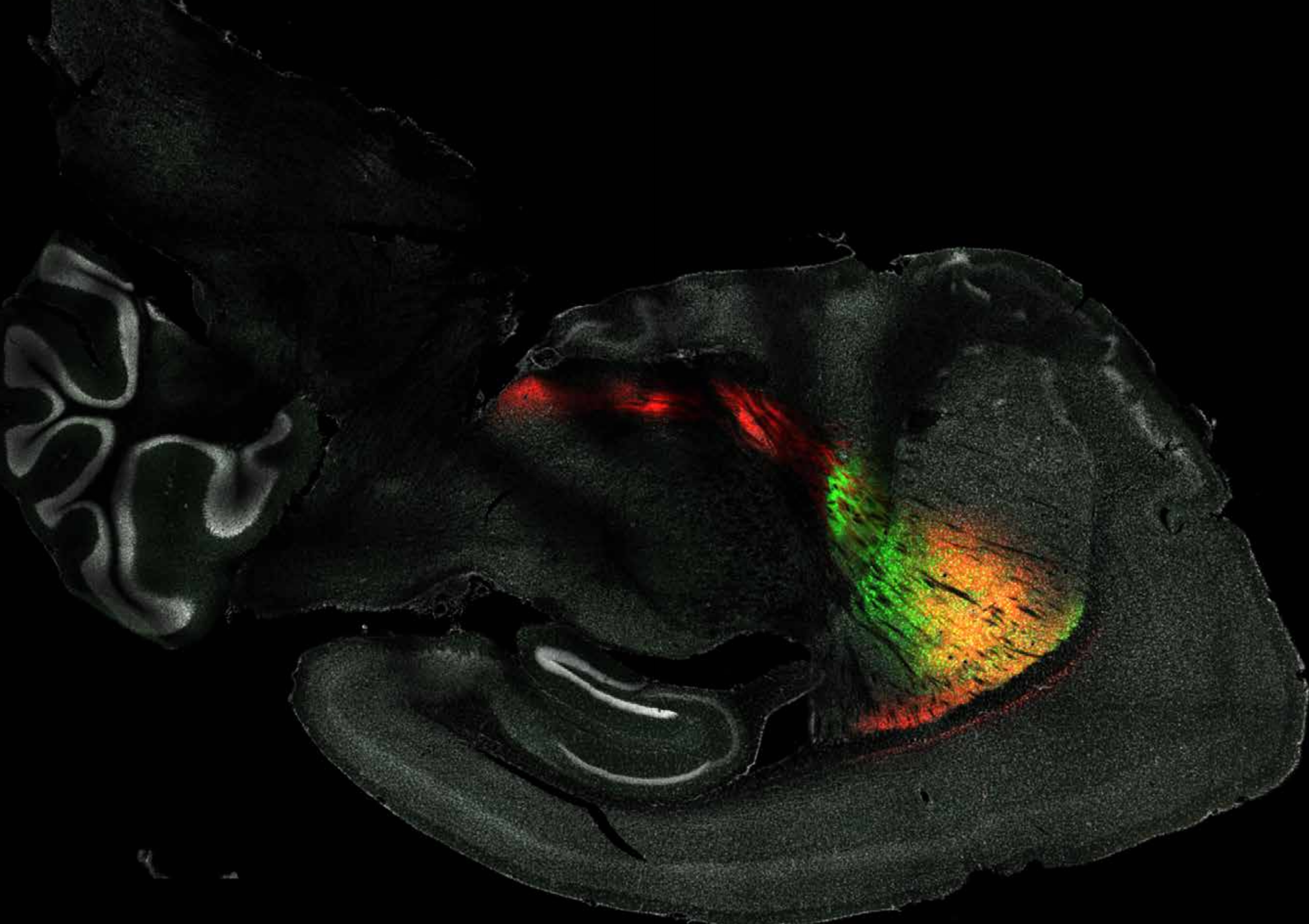
509 Members

CR Community in Numbers

Angola
Argentina
Austria
Bangladesh
Belgium
Brazil
Bulgaria
Canada
Cape Verde
Chile
China
Colombia
Croatia
Czech Republic
Estonia
Frence
Germany
Greece
Hungary
India
Iran
Irland
Israel
Italy
Japan
Mexico
Netherlands
Poland
Portugal
Romania
Russia
South Africa
South Korea
Spain
Sudan
Switzerland
Turkey
United Kingdom
United States
Vietnam

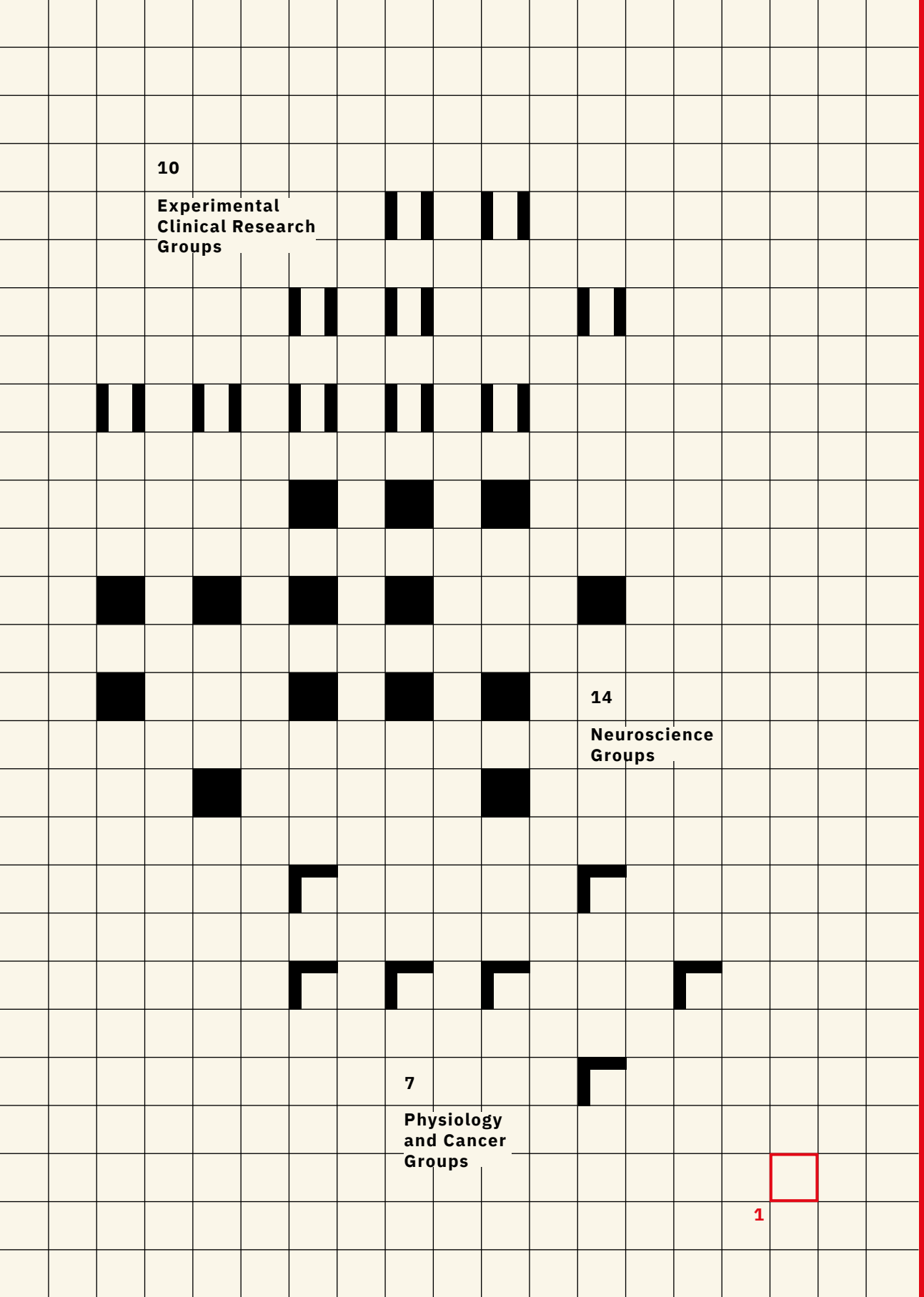
40 Nationalities

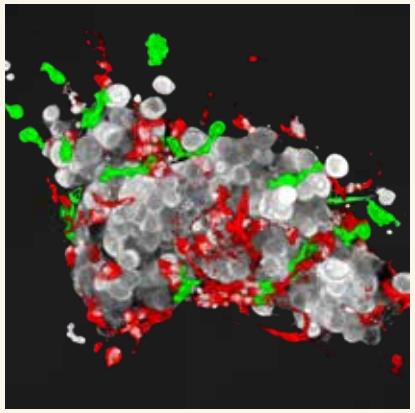




CR integrates three programmes: Experimental Clinical Research, Neuroscience, and Physiology and Cancer. Each programme comprises Groups of scientists and students conducting basic, clinical and/or applied research, often in collaboration with other Groups at CF or beyond.

Research Groups





Methods
Zebrafish microinjection,
immunofluorescence,
in situ hybridisation, RT-PCR,
confocal, spinning disk,
and light-sheet microscopy,
bulk and single-cell RNA sequencing

Model
Zebrafish

Cancer Development and Innate Immune Evasion

Our lab uses the Zebrafish Avatar model as a platform for personalised medicine and to discover innate immune mechanisms and modulators for cancer immunotherapy

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Colorectal Cancer Zebrafish Avatar: patient-derived tumour cells (pink) injected into two-day-old zebrafish embryos, with blood vessels shown in green (GFP).

Our lab developed the zebrafish patient-derived xenograft model (zAvatar). This model relies on the injection of a patient's tumour cells into zebrafish embryos to rapidly test treatments by observing cancer response in a living organism. This personalised approach optimises existing treatments and could transform cancer care. The zAvatar test has shown high accuracy in predicting therapy responses for colorectal, breast, and ovarian cancer, leading to a clinical trial where patients with metastatic breast and ovarian cancer will be randomly assigned to standard or zAvatar-guided treatment.

We also study how tumours evade the innate immune system. How do cancer cells escape and suppress these defences? Can we enhance innate immunity and combine it with immune checkpoint blockade to activate both the innate and adaptive branches of the immune system? Our lab is tackling these questions, focusing on the interactions between innate immunity and human cancer cells in real-time, at single-cell resolution.

Principal Investigator Rita Fior
Lab Manager Bruna Costa
Postdoctoral Researchers Marta Estrada, Raquel Mendes, Vanda Póvoa
PhD Students Ana Beatriz Machado, Beatriz Sebo, Cátia Almeida
MSc Students Salvador Ferreira, Sara Cardoso
Technicians Filipa Amorim, Márcia Fontes

Highlights

We conducted a co-clinical study on colorectal cancer in collaboration with the Champalimaud Clinical Centre and Hospital Fernando Fonseca, demonstrating 91% accuracy of the zAvatar test in predicting disease progression (Costa et al., *Nature Communications*).

Using a zebrafish model of bladder cancer, we uncovered early cellular mechanisms of BCG therapy, showing that BCG recruits and reprogrammes macrophages into a pro-inflammatory state, triggering cytokine expression and tumour cell death via TNF signalling (Martínez-López et al., *Disease Models & Mechanisms*).

In collaboration with iMM Cambridge, we developed a gold-based chemical reaction to selectively break amide bonds for targeted cancer drug release (Unnikrishnan et al., *Journal of the American Chemical Society*). Working with Ghent University, we established a zebrafish model for low-grade serous ovarian cancer to test therapies such as trametinib and luminespib (Fieuws et al., *Cancers*).

After two years of navigating regulatory approvals, our clinical trial on zAvatar-test-guided therapy for relapsed ovarian and metastatic breast cancer was approved by CEIC and Infarmed, marking the start of an exciting new phase for our lab.

Methods
AI models for medical imaging

Model
Human

Computational Clinical Imaging

Develop AI systems to enhance outcomes for cancer patients, support healthcare providers, and improve healthcare systems, while offering education on the safe clinical application of AI research

↑

Digital histopathology slide (top) and the corresponding AI-generated prediction (bottom).

Our group specialises in computational medical imaging, integrating imaging and clinical data to advance oncology research. Using machine learning, we identify key features to address cancer research questions. Our AI models focus on automatic tissue and lesion segmentation, early disease detection, and predicting disease recurrence risk. We collaborate internationally with clinical partners across the UK, France, Italy, Denmark, Sweden, Greece, and Brazil, enriching our research with diverse data.

We are active in major research initiatives like ProCancer-I and EUCAIM, a panEuropean cancer imaging data repository. As founding members of FUTURE-AI, we set guidelines for safe AI use in clinics and enhance AI model fairness and explainability.

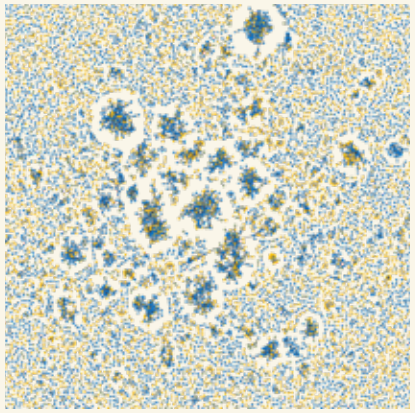
We also work on improving clinical AI infrastructure and communication. By developing large language models, we aim to present AI predictions in a user-friendly way, making complex AI insights accessible for practical healthcare applications.

Principal Investigator Nikolaos Papanikolaou
Postdoctoral Researcher José Almeida
PhD Students Ana Carolina Rodrigues, Ana Sofia Castro Verde, Nuno Rodrigues
Technicians Miguel Chambel, Teresa Mayor

Highlights

The group focused on developing AI models for prostate cancer diagnostics. Specifically, we created deep learning models to automatically segment the entire prostate gland and identify cancerous lesions using a large, multi-institutional dataset spanning nine countries and 13 clinical sites. This dataset – the largest of its kind worldwide – includes over 13,000 prostate cancer patients, multi-parametric MRI scans, and clinical data.

Additionally, we trained and successfully validated a radiomic signature that reduces unnecessary biopsies by up to 22%. Our findings received highly positive feedback from the consortium and were presented at both the European Congress of Radiology in Vienna and the European Multidisciplinary Congress on Urological Cancers in Lisbon.



Methods
Cell culture, RNA & DNA sequencing, flow cytometry, cell-cell interaction analysis, computational techniques, live-cell imaging, genetic engineering, transgenic cell production, CRISPR, lentiviral vector technology

Model
Ex vivo human tissue material

Immunotherapy / ImmunoSurgery

Engineering of smart anti-tumour-directed immune cells

↑

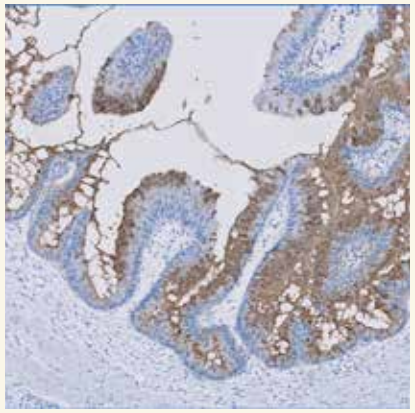
Created using a tool called TCRcloud, this image shows the diversity of T-cell receptors – molecular ‘sensors’ that help immune cells recognise threats – found in tumour-infiltrating lymphocytes.

We are working towards the accreditation of the GMP facility at CF, guided by an international expert panel.
In parallel with expanding anti-cancer T cells from tumour tissue, the Foundation has secured licenses and intellectual property to enhance cell therapy products, aiming to develop safer and more effective treatments for future Phase I clinical trials in solid tumours.
Using CRISPR-based epigenetically reprogrammed cells with anti-cancer receptors previously required two lentiviral vectors – a major biological and regulatory challenge. We have now overcome this hurdle by developing a third-generation lentiviral vector that delivers both an antigen-specific receptor and dCAS9, along with a smart signalling cascade for guide-mRNA delivery. This system is set for preclinical testing in spring 2025.
Additionally, our collaboration with the Breast Unit in the KEYPARTNER Phase I study has enabled the expansion of anti-cancer T cells from triple-negative breast cancer patients.

Principal Investigator Markus Maeurer
Postdoctoral Researchers Carolina Gorgulho, Joana Lérias
Senior Molecular Specialist Dário Ligeiro
Pharmacist Bernardo Marinheiro
Clinical Pathologist Leonardo Lordello
Quality Control Manager Cristina Afonso
Genetic Engineers Karina Balan, Vitaly Balan
Bioinformatician Miguel Ferreira
Technicians Jéssica Kamiki, Miguel Costa, Patrícia António, Rodrigo Eduardo
Visiting Student Matilde Sedas

Highlights

We secured an exclusive license from Stanford University for a broad portfolio of synthetic biology applications across all therapeutic fields and acquired Refuge’s patent portfolio, reinforcing its role in developing advanced cell therapies. This led to key partnerships, including licensing its synthetic biology platforms to Kite, a Gilead company, for potential blood cancer treatments. In 2024, the Foundation partnered with a leading US institution for GMP lentiviral vector production and expanded its collaboration with Stanley Qui (Stanford University) to explore signalling rewiring and immune effector functions in T cells.
Synthetic biology enables precise genetic and epigenetic cell modifications, paving the way for “smart” Advanced Therapeutic Medicinal Products that enhance and sustain anti-cancer immune responses. These therapies hold great promise, especially when combined with existing treatments.
We also welcomed new immunotherapy experts and are honoured to have Christoph Huber join as lead scientific advisor for cell therapy development. Additionally, Carolina Gorgulho was invited by the European Cancer Society for Immunotherapy to present data on tumour-infiltrating T cells in gastrointestinal cancers.



Methods
Immunohistochemistry,
immunofluorescence,
multispectral microscopy,
digital pathology

Model
Human biological
samples

Molecular and Experimental Pathology

We investigate molecular signatures in cancer and its microenvironment to identify new biomarkers that enhance patient outcomes

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Analysis of tissue samples showed that STn levels rise as cancer progresses, from early-stage pancreatic growths – such as the High-Grade Intraductal Papillary Mucinous Neoplasm depicted here – to pancreatic cancer and metastases, suggesting a key role for STn in disease development. Credit: Ana Soares

We apply histopathology techniques to analyse tissue samples from various human solid tumours, correlating findings with clinical data to identify novel biomarkers for cancer diagnosis, prognosis, and treatment response. Our goal is to improve patient management and outcomes.

We have long used multispectral microscopy and recently integrated AI-powered digital pathology to assess molecular signatures of tumour cells and their microenvironment, enhancing our understanding of cancer biology.

Principal Investigator Mireia Castillo-Martin
PhD Student Andreia Maia
MSc Student Ana Soares
Visiting Students Camila Sarmiento, Mafalda Jacob

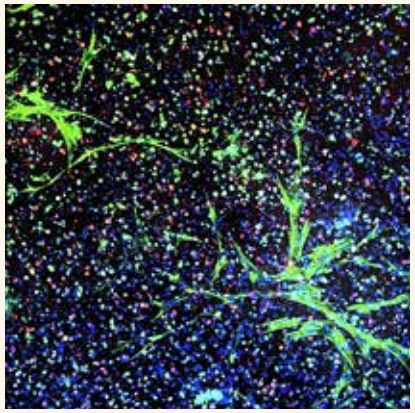
Highlights

In September, Andreia Maia successfully defended her PhD thesis, "The Potential of Natural Killer Cells in Pancreatic Cancer: From Exploring Tumour-Infiltrating Lymphocytes to Novel CAR-NK Cell Therapy", earning honours.

As part of a collaboration with Paula Videira (NOVA Medical School), Ana Soares defended her Master's thesis, "Exploring the Crosstalk Between Sialyl-Tn Expression and Pancreatic Ductal Adenocarcinoma Progression", in December.

The lab also launched *PRECORMIDEL* (Prediction of Rectal Cancer Complete Response to Chemoradiotherapy by Multiscale Imaging and Deep Learning Analyses), a collaborative project with Leonardo Vanneschi (NOVA Information Management School), and Davide Accardi and José Azevedo (CF). The research will be led by Camila Sarmiento.

As part of the *Ciência di Noz Manera / Science Our Way* outreach programme, Mireia Castillo-Martin engaged with 8th-grade students at Escola Dr. Azevedo Neves in the Lisbon suburbs.



Methods
Flow cytometry, genomics, proteomics, cell cultures

Model
Human, mouse, cell lines

Myeloma Lymphoma Research

Uniting clinical haematologists and researchers, we focus on Multiple Myeloma to advance lymphoid cancer treatment

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Bone marrow cells self-organise and interact within BioMarrow, a 3D ex vivo model of multiple myeloma. Confocal image showing support cells forming networks within the matrix after 7 days of culture. Blue: DAPI (nuclei), Green: F-actin (phalloidin), Red: CD38+, Grey: CD45+.

We focus on the blood cancers Multiple Myeloma (MM) and mature B-cell Lymphomas, emphasising four key areas: (1) Identifying biomarkers for Monoclonal Gammopathy of Undetermined Significance and MM diagnosis using liquid biopsies to analyse circulating DNA, tumour cells, proteins, and immune profiles; (2) Developing novel therapies for MM and Lymphoma targeting the bone marrow microenvironment, using mouse models and a 3D organoid drug screening platform; (3) Studying the role of neuronal signals in MM progression and their effects on MM cells and natural killer cells within the bone marrow, aiming to improve patient outcomes and suggest new treatment approaches; (4) Enhancing Lymphoma tumour assessment with advanced imaging techniques.

Our goal is to advance the treatment of mature B-cell malignancies, improve patient care, and introduce innovative therapies, providing practical insights for haematologists and deepening understanding of the tumour microenvironment.

Principal Investigator Cristina João
Postdoctoral Researchers Ana Queirós, Bruna Ferreira, Emilie Arnault Carneiro
PhD Students Ana Filipa Barahona, Joana Caetano, Raquel Lopes
MSc Students Jéssica Rodrigues, Madalena Silva, Margarida Domingos
Technicians Diana Lourenço, Madalena Grenhas

Highlights

Cristina João remained a board member and PI at EuroFlow and director of the Portuguese Group of Multiple Myeloma. She co-authored five publications, including studies on treatment approaches, quality of life, disease manifestations in MM, and healthcare use in amyloidosis.

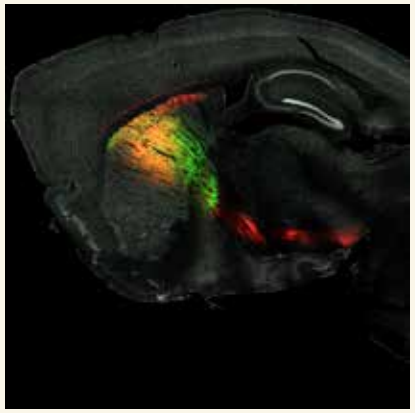
Ana Queirós supervised MSc students and advanced single-cell RNA sequencing bioinformatics on bone marrow immune cells in a MM model, earning *Best Presentation* at the Portuguese Society of Hematology and presenting at the American Society of Hematology.

Emilie Carneiro published research on extracellular vesicle isolation and secured an Associação Portuguesa Contra a Leucemia grant.

Filipa Barahona refined image analysis skills while continuing PhD studies. Joana Caetano advanced in computational spectral cytometry, presented award-winning research, and co-authored a *FrontOnc* paper.

Raquel Lopes submitted her PhD thesis to the University of Lisbon and joined Ana Queirós in STEM outreach through *Ciência di Noz Manera*.

Diana Lourenço and Madalena Grenhas developed a 3D *ex vivo* bone marrow model, now submitted for publication. MSc students Jéssica Rodrigues, Margarida Domingos, and Madalena Silva expanded their expertise in cell culture and spectral flow cytometry.



Methods
Electrophysiology,
dopamine transporter imaging,
calcium imaging, optogenetics,
chemogenetics

Model
Human, mouse

Neural Circuit Dysfunction

Our main goal is to map movement disorder symptoms to brain circuit dysfunctions and use that information to develop specific circuit manipulations that can reverse these symptoms

↑

Two complementary neural pathways, labeled in red and green, originate in the striatum and work together to select appropriate actions based on context. Dysfunction in these pathways is linked to movement disorders such as Parkinson's disease and dystonia.

Our understanding of the environment, memory recall, and emotion regulation is facilitated by the processing of information across various brain circuits. This delicate balance can be disrupted by brain disorders, where symptoms reflect disturbances in specific neural circuits. Even the loss of a single neuron group can trigger widespread changes across different circuits, manifesting as varied symptoms.

Our research group adopts a systems approach to investigate brain circuit dysfunctions, particularly focusing on movement disorders like dystonia and Parkinson's disease. By studying both clinical populations and animal models, we aim to address critical questions. We employ a blend of detailed behavioural analysis, brain imaging, electrophysiology, and optogenetics to uncover the mechanisms by which symptoms arise from disordered motor control circuits.

Principal Investigator Joaquim Alves da Silva
Postdoctoral Researchers Daniela Pereira, Filipa Barros, Marcelo Mendonça
PhD Students Madalena Bettencourt, Pedro Ferreira
MSc Students Afonso Germano, Matilde Gaiolas, Raquel Colucas
Technicians Dario Bolli, Diana Bernardo, Pedro Coelho, Sónia Batáguas

Highlights

We continued advancing our research on the pathophysiology of movement symptoms in Parkinson's disease and the neural circuit changes underlying dystonia.

We published two studies on Parkinson's disease tremor, revealing its link to distinct brain degeneration patterns. This work resulted from a fruitful collaboration with the Neuropsychiatry and Nuclear Medicine Groups.

Our team helped organise two international conferences on neurodegenerative and movement disorders and participated as faculty in the Motor Control Cajal Course. We were also active in science outreach, taking part in European Researchers' Night and other public engagement initiatives.

The lab welcomed a new Master's student, a new PhD student, and two technicians, while one student successfully defended his Master's thesis. We also presented at several scientific meetings, with four presentations receiving awards.

Methods
Calcium imaging, MRI, PET/SPECT, optogenetics, TMS, psych/behavioural assessments, psychophysics

Model
Human, mouse

Neuropsychiatry

Cortico-striatal function in health, and dysfunction in disease, in the context of reward-related behaviours

↑

Carbohydrates influence flavour preferences through a process called flavour-nutrient conditioning, as explored in a study from the lab, led by Ana Fernandes and Gabriela Ribeiro.
Credit: Diogo Matias (CEO team)

The Neuropsychiatry Unit is a clinical and research unit, belonging to the Champalimaud Clinical Centre (CCC) and to CR. The unit fosters a strong connection between clinical practice and scientific advancements, ensuring that, on the one hand, knowledge generated in the laboratory is rapidly translated into tangible benefits for patients, and on the other, that research questions are inspired by the real needs of patients.

The clinical arm of the unit focuses on the study and treatment of complex neuropsychiatric conditions, including mood and obsessive-compulsive disorders, mental health in patients with cancer, movement disorders and other neurodegenerative diseases affecting cognition. Beyond developing clinical programmes and innovative projects in these fields, the research arm is a human and translational neuroscience laboratory, working at the intersections between psychology, psychiatry, neurology and neuroscience.

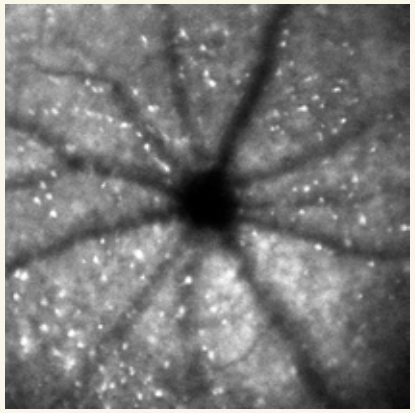
Principal Investigator Albino Oliveira-Maia
Postdoctoral Researchers Ana Fernandes, Elena Zamfir, Jaime Caballero, Joana Crisóstomo, João Duarte, Raquel Lemos
PhD Students Ana Maia, Diogo Melo, Francisco Viana, Nelson Descalço, Rita Cavaglià, Tiago Quendera (Co-Sup. Z. Mainen)
Technicians Daniel Martins, Margarida Silva
Clinical Fellows (primary appointment at the Clinical Centre) Ana Rocha, André Abreu, Bernardo Barahona-Corrêa, Carolina Seybert, Daniel Silva, Gonçalo Cotovio, Isabel Manica, Jaime Grácio, João Estrela, José Oliveira, Marcelo Mendonça, Patrícia Pereira, Sílvia Almeida, Sofia Marques

Highlights

The Neuropsychiatry Unit expanded its capabilities in transcranial magnetic stimulation and developed new platforms and large-scale data analysis strategies in neuroimaging. Research remained primarily funded through competitive grants for investigator-initiated studies, including a new project supported by the Foundation for Science and Technology (FCT). which also awarded PhD fellowships to two Unit members.

Additionally, we collaborated on industry-sponsored clinical trials and studies, including research on a new antidepressant and the development of digital tools for cognitive assessment.

The Unit contributed to significant advancements in neuroscience, neurology, and psychiatry, reflected in key publications. These included a review on the therapeutic potential of psychedelics for psychiatric disorders (*American Journal of Psychiatry*), a systematic evaluation of psychological interventions in psychedelic treatments (*Lancet Psychiatry*), and novel insights into dopamine's role in movement and movement disorders (*Current Biology, NPJ Parkinson's Disease*) as well as in food reinforcement (*PLoS Biology*). These studies highlight our commitment to bridging neuroscience and clinical neuropsychiatry.



Methods
Cell and molecular biology,
genome engineering,
imaging, flow cytometry,
electroretinography, OCT

Model
Human cell-based,
mouse

Ocular Low-cost Gene Therapy

RNA-based therapeutics for eye diseases

↑

Optical coherence tomography image of a mouse retina from a choroideremia model, a genetic disorder causing progressive vision loss, revealing early pathological changes.

Our group aims to develop low-cost solutions to gene therapy in vision, with the purpose of making powerful treatments accessible worldwide. Our approach involves adapting mRNA technology to address inherited eye diseases and chronic retinal conditions. By combining the in vitro mRNA system with nanoparticles, we are exploring patient-friendly therapies in the field of ophthalmology.

Principal Investigator Miguel Seabra
Assistant Researcher Pedro Antas
Postdoctoral Researcher Luisa Lemos
PhD Student Ana Fonseca
MSc Student Cláudia Carvalho
Technicians Diogo Bruno, Shuvajit Rakshit

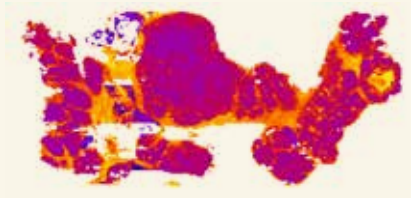
Highlights

We established new international collaborations with TraffikGene (Spain) and Niren Murthy (Berkeley), experts in non-viral mRNA therapeutic systems, paving the way for advanced gene delivery strategies. Through the Champalimaud/LV Prasad Global Eye Initiative, we also launched a collaboration with Prashant Garg to develop new drug delivery systems for eye diseases.

Funding from the Choroideremia Research Foundation (2023) supported our ongoing work on prime editing technology and the mechanisms of retinal pigment epithelium degeneration in choroideremia.

Cláudia Carvalho successfully defended her Master's thesis, earning a perfect grade (20/20), demonstrating that non-viral mRNA delivery restored functional REP1 protein expression in iPSC-derived RPE cells from choroideremia patients.

We presented our research at major international conferences, including the Association for Research in Vision and Ophthalmology 2024 Annual Meeting (Seattle) and the 4th International Choroideremia Congress (Montpellier). Additionally, our team engaged in outreach activities, such as European Researchers' Night, discussing the role of animal models in biomedical research. Our work led to two publications in top-tier journals.



Methods
MRI, optogenetics, electrophysiology, histology, intrinsic optical microscopy

Model
Mouse, rat

Preclinical MRI

Harness ultrahigh field MRI to understand the mechanisms by which modifications in tissue microstructure transcend globally to modulate function and behaviour, and to explore the potential of these as early disease biomarkers

↑

Diffusion magnetic resonance imaging of a human sample showing a pancreatic cancer lesion and its precursor.

We began 2023 by discovering macroscopic intrinsic oscillatory modes in fMRI signals using a novel ultrafast method. These global structures coordinate spontaneous brain activity, prompting inquiries into their biological basis, alterations through brain stimulation, and potential for early detection of brain pathology or neurodegeneration. This aligns with our efforts in mapping conditions such as stroke, gliomas, and neurodegeneration.

We've also advanced research on neurodegenerative diseases and cancer models. Highlights include studying sensory dysfunction in a Parkinson's disease mouse model and collecting extensive data for an Alzheimer's disease model. We've progressed in detecting precancerous lesions called Pancreatic Intraepithelial Neoplasias, and Joana Carvalho has mapped visual receptive fields in visually-deprived rats using fMRI, yielding remarkable findings in adult plasticity. Additionally, we've refined advanced MRI techniques for better data acquisition and noise reduction, with wide-ranging applications.

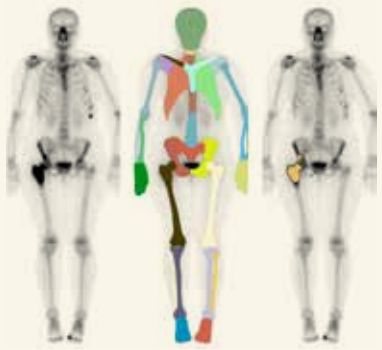
Principal Investigator Noam Shemesh
Postdoctoral Researchers Andrada Ianus, Cristina Chavarrías, Joana Cabral, Joana Carvalho, Rafael Henriques, Rita Gil, Sónia Gonçalves
PhD Students Carlos Bilreiro, Frederico Severo, Rita Alves, Ruxanda Lungu, Sara Monteiro
Technician Francisca Fernandes

Highlights

Our efforts in previous years paid off in 2024, and several chapters have been closed. Two of our top postdoctoral researchers secured independent PI positions: Joana Carvalho became an Assistant Professor at the University of Coimbra (Portugal), and Andrada Ianus was appointed as a tenured Lecturer at King's College London (UK). Andrada also won the prestigious ERC Starting Grant, securing €2M over five years to advance MRI-based detection of micrometastases.

INPDP student Rita Gil graduated in June, completing her research on the visual system and earning multiple conference awards, including *Best PhD Thesis* from the European Society for Molecular Imaging. Carlos Bilreiro finalised his PhD's core experimental work, publishing groundbreaking findings on detecting PaNiNs using diffusion MRI, which gained national media attention.

Our team received several prestigious awards, including *Summa Cum Laude* (Joana Carvalho) and *Magna Cum Laude* (Ruxanda Lungu) at ISMRM, *Outstanding Abstract* at ESMRMB (Rita Gil), and *Best Poster Award* at EMIM (Sara Monteiro).



Methods
Image processing/quantification, imaging biomarkers, statistical methods/ML, radiopharmaceuticals, theranostic personalised dosimetry

Model
Human

Radiopharmacology

To use radiopharmaceuticals to promote better diagnoses, improve prognostication with new biomarkers and develop new treatments to achieve better outcomes for patients

↑

Bone scan (left), AI-generated bone segmentation (middle), and AI-identified malignant lesion segmentation (right, highlighting three regions).

Our lab maintains a strong partnership with the Nuclear Medicine-Radiopharmacology clinical service, working collaboratively to enhance patient diagnosis, monitor disease progression, evaluate therapy responses, and provide treatment using radiopharmaceuticals – molecules tagged with radionuclides. Our research is dedicated to developing new radiopharmaceuticals and software tools that positively affect patient care within clinical settings.

We are also focused on advancing personalised dosimetry in theranostics, which involves planning and verifying radionuclide therapy effectiveness. In terms of software development, our goals include refining radiation dosimetry related to radiopharmaceutical use and enhancing the processing and analysis of imaging data. This involves creating software capable of classifying and quantifying diseases linked to cellular functional abnormalities.

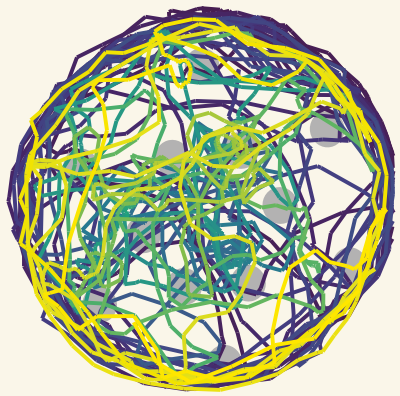
Principal Investigator Durval Costa
Mathematician Francisco Oliveira
Physicists Mauro Costa, Paulo Ferreira, Rui Parafita,
Radiopharmacist Ana Capacho
Radiochemist Francisco Silva
Nuclear Medicine Physicians Ângelo Silva, Carla Oliveira*, Joana Castanheira, Ricardo Teixeira, Sofia Vaz
Biomedical Engineers Cláudia Constantino*, Luísa Silva
PhD Students * and Jorge Borbinha
Masters Students Adriana Raileanu, Beatriz Ornelas, Inês Cardoso, Maria Iláco Pacheco, Maria Luísa Dias, Maria Trindade Santos, Marta Almeida, Marta Jacques
Technicians Alexis Rodrigues, Ana Canudo, Ana Siqueira, Andreia Figueiredo, Beatriz Correia, Helena Delgado, Juliana Correia, Mariana Silva, Marisa Machado*, Miguel Andrade, Rita Oliveira, Sónia Teixeira, Vanessa Santos

Highlights

Our team contributed to 14 peer-reviewed publications in international journals and conferences, including 8 research articles, 3 guidelines, 2 comments, and 1 review.

We also published 9 peer-reviewed abstracts in the two leading international journals in Nuclear Medicine, based on presentations at *EANM'24* and *SNMMI 2024*. Notably, the abstract "Impact of Fully Automatic Deep-Learning-Based Segmentation in Tumor Quantification of [18F]FDG PET/CT Scans" won the *SNMMI 2024 International Best Abstract Award for Portugal*, while "Deep-Learning-Based Fully Automatic Malignant Lesion Segmentation in Whole-Body [68Ga]Ga-PSMA PET/CT Scans" was selected for the *EANM'24 Highlights Lecture*.

Additionally, several lab members were keynote speakers at national and international conferences, and four Master's students successfully defended their theses and earned their degrees.



Methods
Neural circuit manipulations, automated behavioural assays, volumetric calcium imaging, CRISPR, RNAi screens, isotope-resolved metabolomics, scRNAseq

Model
Fruit fly

Behaviour and Metabolism

How do nutrients shape brain function, behaviour, and physiology?

↑

Video tracking of flies around food sources (grey circles) reveals how they forage under various dietary challenges. This approach led to the discovery that Ir76a is an essential odorant receptor allowing flies to identify and ingest gut bacteria that help offset amino acid deficiencies.

The food we eat affects every aspect of life, including ageing, reproduction, lifespan, mental state, and mood. For better or worse, we are what we eat. Yet, food choice and how nutrients affect brain function remain a mystery. What neural processes drive us to pick a pretzel over an apple, or a steak over ice cream? How does the brain detect nutrient needs and translate them into decisions?

We tackle these questions using *Drosophila melanogaster*, one of the most powerful genetic models available. The fruit fly allows us to combine genetic circuit manipulations, activity imaging, automated quantitative methods for studying behaviour, microbiome manipulations, and large-scale genetic screens. By deploying these different techniques, we take an integrative neuroscience approach to solving this whole-organism problem.

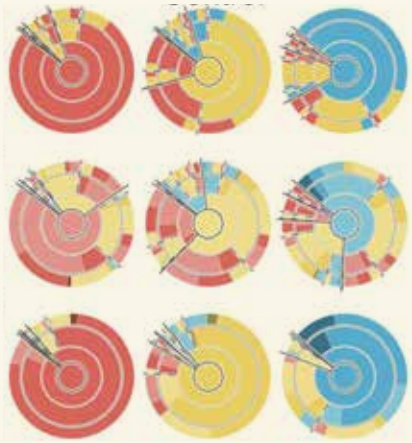
Principal Investigator Carlos Ribeiro
Lab Manager Ana Elias
Postdoctoral Researchers Daniel Münch, Gili Ezra, Ibrahim Taştekin, Silvia Henriques
PhD Students Arina Dygay, Rita Figueiredo, Rory Beresford
MSc Student João de Sena Ribeiros
Visiting PhD Student Cláudia Gil
Technicians Célia Baltazar, Inês Haan de Vicente, Marcelo Dias

Highlights

We made significant strides in understanding how dietary cues influence behaviour and brain function. A major milestone was our co-authorship on the FlyWire consortium publication, which maps the complete connectome of the adult female *Drosophila brain*. Our lab contributed by annotating key parts of the gustatory and feeding circuits, helping to lay the foundation for understanding how taste perception drives feeding decisions.

We also published a preprint presenting a comprehensive genomic analysis of how animals and the brain respond to essential amino acid deprivation. This work highlights extensive transcriptional changes and reveals that animals rewire their olfactory system to seek protein sources and commensal bacteria to overcome nutrient deficiencies.

Beyond research, we remained deeply engaged with the broader scientific community. Carlos Ribeiro completed his mandate as Secretary General of *FENS* and was appointed inaugural chair of the new *Brain-Body Interaction Conference* at Cold Spring Harbor Laboratory, set for 2026.



Methods
Quantitative behavioural analysis, cardiac and muscle in vivo imaging, genetics manipulation, optogenetics, neuronal anatomy

Model
Fruit fly

Behavioural Neuroscience

We study the rapid physiological and neural changes triggered by external threats that help organisms survive

↑

These charts show how often mice walk, freeze, or stay still when there's no threat. The circular diagrams track how their behaviour changes over time.

From fish to primates, animals freeze when facing distant or inescapable threats. In mammals, this behaviour involves multiple brain regions, integrating various information sources. We recently discovered that fruit flies also freeze in response to threats. Using this model, we demonstrated that threat-induced freezing is a distinct internal state, different from spontaneous immobility, as measured by the animal's cardiac activity.

Surprisingly, we found that freezing is energetically costly, contradicting the belief that it is an energy-saving state. To understand how context affects freezing, we study how flies process social and spatial cues and how these influence their response. By investigating sensory detection of visual looming threats and the neurons involved in freezing, we aim to uncover how the brain integrates threat information with environmental signals to guide survival behaviour.

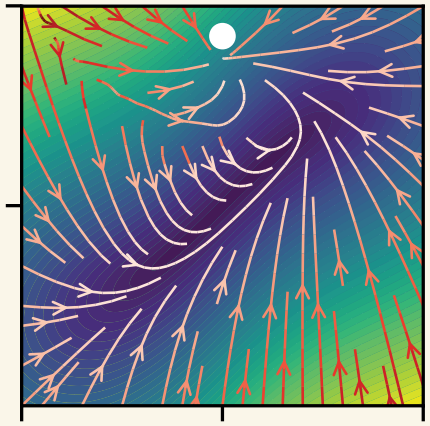
Principal Investigator Marta Moita
Postdoctoral Researchers Anna Hobbiss, Alexandre Leitão, Clara Ferreira, Natalia Barrios, Ricardo Neto Silva
PhD Students Charlotte Rosher, Marco Colnaghi, Matheus Farias, Mirjam Heinemans, Violetta La Franca
MSc Students Cleusia Manuel, Mariana Franco
Technicians Ana Eugénio, Rui Gonçalves, Zara Singh

Highlights

We published a study showing that visual stimuli mimicking an approaching object reliably trigger defensive responses but fail to drive robust threat learning. This work helps define the limits of threat learning mechanisms.

We also released a preprint in collaboration with César Mendes (NOVA Medical School), describing the unexpected discovery of pulsatile muscle activity in fruit fly legs, offering unprecedented insights into motor control.

Alexandre Leitão received an FCT Exploratory Grant to study how genetic background influences neuronal circuits underlying defensive behaviours. Matheus Farias defended his PhD thesis on visual input and descending neurons involved in sustained defensive behavioural states, developing new behavioural setups and an analysis pipeline. Finally, Cleusia Manuel completed her Master's thesis on how threats modulate cardiac activity in fruit flies.



Methods
Behaviour, electrophysiology, optogenetics, theory

Model
Human, rat, mouse

Circuit Dynamics and Computation

We are interested in identifying generic computational principles at play during decision-making

↑

Flow dynamics of an optimally controlled neural network. Each point represents a possible low-dimensional network state, with arrows indicating its evolution over time. The controller's objective is to guide the network state toward the target region, marked by the white dot.

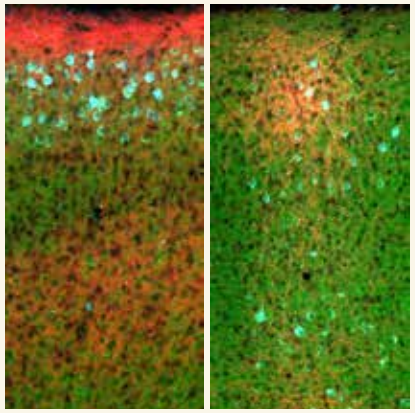
Our lab uses both experimental and theoretical approaches to study decision-making, using mice, rats, and humans as model systems. This approach enables us to formulate theories based on empirical evidence about basic sensory-guided decisions. Our methods include large-scale electrophysiology, perturbations, quantitative behavioural analysis, and mathematical modelling. The focus of our current research encompasses four main areas: (1) Understanding the neural basis of decisions related to sensory intensity through psychophysical tasks; (2) Employing quantitative behavioural methods to study sensory intensity processing in individuals with autism spectrum disorder and in animal models of the condition; (3) Exploring how varying brain-states of engagement or arousal influence decision-making; (4) Developing mathematical models to understand the interaction between controlled and automatic processes during decision-making, both at the behavioural level and at the level of neural circuits.

Principal Investigator Alfonso Renart
Postdoctoral Researchers Juan Castiñeiras, Raphael Steinfeld (Co-Sup. C. Machens)
PhD Students Anh Nguyen, Catarina Fonseca, Mafalda Valente, Marcel Graetz (Co-Sup. D. McNamee), Marco Colnaghi, Naz Belkaya, Tiago Costa (Co-Sup. G. Polavieja), Sofia Freitas (Co-Sup. J. Paton)
MSc Students Mauro Fernandes, João Pimenta
Technicians André Monteiro, Filipe Coutinho, Joan Gort, José Grilo, Raghavendra Kaushik, Ulysses Tsai

Highlights

We published one research article and two preprints. One study explores how the neural representation of choice and sensory stimuli differs across auditory cortex layers. Another demonstrates that time-varying hidden cognitive variables can be decoded from mice's facial movements during a foraging task. The third introduces a mathematical framework for optimising spiking neural network control.

Our team saw significant changes. Juan Castiñeiras earned his PhD in early 2024 and is continuing as a temporary postdoc. Raphael Steinfeld transitioned to industry, Filipe Coutinho began a PhD in Paris, and both Mauro Fernandes and Ulysses Tsai moved on from the lab. We welcomed Catarina Fonseca as a new PhD student, José Grilo as a hardware/software engineer collaborating with our team and the CR hardware platform, and Raghavendra Kaushik and André Monteiro as research technicians.



Methods
Electrophysiology, optogenetics, two-photon microscopy, quantitative behaviour

Model
Mouse

Cortical Circuits

We study how the neocortex combines internal knowledge of the world with sensory information to give rise to perception

↑

Neurons communicating across cortical areas in the mouse brain. Neurons projecting to a cortical area are shown in blue. Left: Ascending neurons from a lower visual area. Right: Descending neurons from a higher-order visual area.

Our brain continuously interprets the environment around us to plan and guide our actions. This process entails integrating sensory inputs with internal models of the world. We investigate how the brain acquires and uses knowledge about the world to influence perception. By employing optical, electrophysiological, and behavioural methods in mouse models, we explore how brain circuits across various areas learn and retain information about expected regularities of the world. Moreover, we examine how these learned patterns are integrated with sensory information to shape perception.

Principal Investigator Leopoldo Petreanu
Postdoctoral Researchers Flora Vasile, Matthijs oude Lohuis (Co-Sup. C. Machens), Rodrigo Dias
PhD Students Beatriz Belbut, Devanshi Shah, Kerem Sarikaya, Solene Sautory (Co-Sup. Z. Mainen)
MSc Student Anastasia Simonoff
Technicians Feray Feuerhake, Gonçalo Ferreira

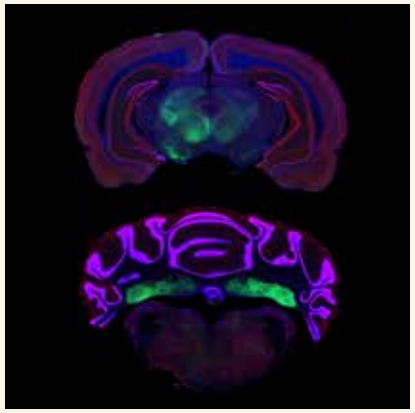
Highlights

We welcomed Devanshi Shah and Kerem Sarikaya as PhD students and Anastasia Simonoff as a Master's student, while Solene Sautory successfully defended her PhD thesis.

In a book chapter with Alessandra Angelucci, Leopoldo Petreanu explored how brain regions communicate through feedforward and feedback pathways. Focusing on vision, they reviewed how these connections function across species.

Our *Nature Communications* study revealed that the auditory cortex transmits sound location information to the visual cortex, even though it lacks a structured map like vision. This suggests the brain may use these signals to associate sights and sounds, contributing to unified perception.

In *Neuron*, we showed that visual experience fine-tunes feedback connections in the brain. Exposure to visual stimuli reduces redundant links between higher and lower visual areas, improving how the brain processes surrounding visual information. This study provides insight into how experience shapes perception at the neural level.



Methods
Behaviour, neurobiology, molecular biology, mathematical modelling, robotics

Model
Mouse, rat

Learning

Circuit and computational basis of timing, learning, and behavioural control

↑

Neurons (green) projecting to the thalamus from output structures of the basal ganglia (top) and cerebellum (bottom). Understanding the respective contributions of these two brain systems to adaptive behaviour is a question central to many projects in the lab.

The brain controls behaviour, shaped by 600 million years of evolution. In vertebrates, the spinal cord and hindbrain manage automated forms of control like reflexes, central pattern generators, and movement primitives. Higher brain systems select, combine, and modulate these processes through learning – our primary focus.

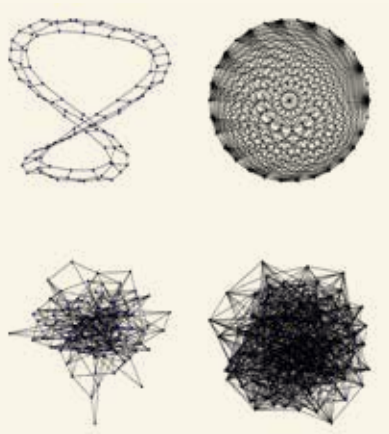
Control by these systems is both heterarchical (distinct computations by specific brain systems), and hierarchical (operating at different abstraction levels). Building on our interest in how neural circuits acquire a temporal basis for learning, we are uncovering how hierarchical representations across brain systems interact to produce effective behaviours. We explore how different brain regions manage various aspects of behavioural control. Our approach combines behavioural techniques, to isolate and quantify specific brain processes, with computational modelling and modern tools for monitoring and manipulating neuron activity during behaviour.

Principal Investigator Joe Paton
Postdoctoral Researchers Caroline Haimerl (Co-Sup. C. Machens), Daniel Nunes, Filipe Rodrigues, Georg Raiser, Pawel Bujalski
PhD Students Francisco Azevedo, Margarida Sousa (Co-Sup. D. McNamee), Prannay Reddy, Renato Sousa (Co-Sup. R. Oliveira), Sofia Freitas (Co-Sup. A. Renart), Teresa Duarte (Co-Sup. M. Carey)
MSc Student Livia Patrizi
Technicians Ben Zarov, Rodrigo Martins, Simon Zamora

Highlights

We branched out toward a more holistic, integrative approach to understanding behaviour, studying multiple brain systems simultaneously. This included new theoretical collaborations, such as with the McNamee lab, to understand how the brain learns through experience to represent environmental features for action. We also initiated a fledgling project spanning the Hardware and Software platform and several research groups to study neurobiologically inspired mechanisms for controlling robotic systems.

One highlight of our work being presented internationally was PhD student Margarida Sousa delivering the opening selected talk at the COSYNE conference to an audience of over 1,000 participants! Filipe Rodrigues' study was published in *Neuron*, Joe Paton contributed a book chapter to the upcoming Dopamine Handbook, and Caroline Haimerl, Rodrigues and Paton co-authored a *Annual Reviews in Neuroscience* article on the centrality of temporal processing for understanding the brain's layered, hierarchical control systems. Lastly, Haimerl was awarded the prestigious *Transition to Independence Award* from the Simons Foundation, bridging her postdoctoral work to her independent research programme.



Methods
Machine learning,
behavioural analysis,
learning methods

Model
Zebrafish,
computational

Mathematics of Behaviour and Intelligence

We study how interacting units (animals, neurons or mathematical agents) can give rise to intelligent behaviour

↑

We developed Algebraic Machine Learning (AML) to explain problems using algebraic axioms. Here, we explained what a Hamiltonian graph is–a closed path that visits each vertex (blue dot) once before returning to the start. AML then successfully identified the Hamiltonian graphs.

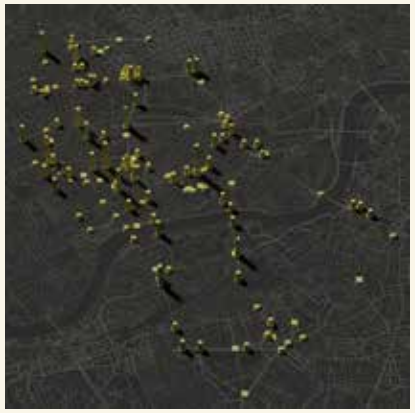
Our goal is to develop models focusing on predictability and understandability to enhance the study of animal behaviour and neuronal circuits. We use deep learning tools for insights into collective animal behaviour. For example, idtracker. ai tracks movements of individual animals in groups, idmatcher.ai tracks the same animals across different videos, and ReactNet identifies responses to stimuli. This modular approach helps us balance predictability and intelligibility in modelling collective movements.

We also apply advanced machine learning to predict biological phenomena related to genetics, epigenetics, and neuronal circuits. Our lab is exploring the development of learning systems founded on different mathematical principles. We are pioneering Algebraic Machine Learning, based on Abstract Algebra, which enables algebraic representations of data with generalisation guarantees. We are assessing this method's impact on accuracy, transparency, parallelism, and energy efficiency.

Principal Investigator Gonzalo de Polavieja
Senior Research Scientist Fernando Martín-Maroto
Postdoctoral Researchers David Méndez, Panos Firbas
Software developer Jordi Torrents
ML Researcher Carolina Gonçalves
PhD Students Dean Rance (Co-Sup. M. Orger), Tiago Costa (Co-Sup. A. Renart)
Technician Dylan Feldner

Highlights

We further advanced Algebraic Machine Learning, which now rivals standard Machine Learning methods despite not relying on optimisation, statistics, or search. Additionally, we made significant progress in Machine Learning techniques for (a) tracking animals in collectives, (b) predicting zebrafish brain activity, and (c) forecasting genomic sequences.



Methods
Theory, simulation,
data analysis

Model
Human, bat, rodent,
adaptive agent

Natural Intelligence

We seek algorithmic
and circuit-level descriptions
of flexible cognitive processing
and behavioural adaptation

↑

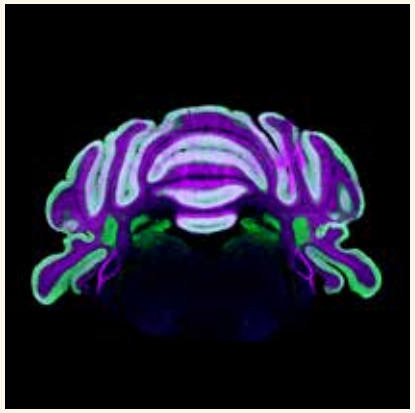
A conceptual illustration of how expert navigators mentally represent London. The overlaid yellow “buildings” indicate the time taxi drivers spend thinking at each location.

The lab’s interests span the internal processing of the external world to physical embodied interactions in natural systems throughout the animal kingdom, from understanding the detailed dynamics regarding how brains internally conceptualise and generate inferences to learning to optimise continuous behaviours.

Principal Investigator Daniel McNamee
Postdoctoral Researchers Carlos Stein, Francesco Trapani, William Walker
PhD Students Inês Laranjeira (Co-Sup. Z. Mainen), Jaime Arlandis (Co-Sup. Z. Mainen), Marcel Graetz (Co-Sup. A. Renart), Margarida Sousa (Co-Sup. J. Paton)
Technicians Mariana Duarte, Sara Monteiro

Highlights

A collaborative project between CR and UCL on the cognitive strategies of taxi drivers was published. Daniel McNamee was invited to speak at multiple workshops on the nature of intelligence at UC Berkeley, UCLA, and the Santa Fe Institute over the summer. Mariana Duarte won an award for her research presentation at the Responsible AI Forum at Casa da Música in Porto.



Methods
Quantitative behavioural analysis, neurophysiology, optogenetics, chemogenetics

Model
Mouse

Neural Circuits and Behaviour

Studying the neural circuits for learned and coordinated movement in mice

↑

Fluorescent image of the cerebellum in a mouse brain.

We aim to understand how activity is orchestrated within neural circuits to give rise to behaviour. With this in mind, our research focuses on the cerebellum, a brain area critical for coordinated motor control and motor learning and whose circuitry is well characterised. The lab's major achievements so far include: (1) Establishing a quantitative framework to identify specific cerebellar contributions to mouse locomotor coordination (e.g. Machado et al., *eLife*, 2015; Machado et al., *eLife*, 2020); (2) Dissecting circuit mechanisms for cerebellar learning and its modulation by behavioural state (Albergaria et al., *Nature Neuroscience*, 2018; Silva et al., *Nature Neuroscience*, 2024); (3) Establishing a paradigm for locomotor learning in mice (Darmohray et al., *Neuron*, 2019).

Our ongoing work combines quantitative behavioural analysis and neurophysiology with genetic tools to understand how cerebellar circuits enable complex, coordinated movement flexibly adapted for a wide variety of contexts.

Principal Investigator Megan Carey
Postdoctoral Researchers Alice Geminiani, Ana Machado, Coralie Hérent, Jorge Ramirez-Buritica, Romain Sala, Tatiana Silva
PhD Students Ana Gonçalves, Diogo Duarte, Marta Forcella, Merit Kruse, Teresa Duarte (Co-Sup. J. Paton)
MSc Student Margarida Gingeira
Technicians Amma Otchere, Francesco Costabile

Highlights

In Nature Neuroscience, we showed that climbing fibers, key neurons in the cerebellum, are essential for associative learning – without them, learning fails completely. Megan Carey also authored a *Current Biology* primer on the cerebellum, exploring its role beyond motor control into cognition. Finally, a *Journal of Neuroscience* study on zebrafish, conducted in collaboration with the Orger and Portugues labs, uncovered how the inferior olive processes visual information, shedding light on how sensory inputs shape motor learning.

In other work, the lab explored how the brain controls movement and memory. One preprint we published found that as walking speed increases, the nervous system adjusts by recruiting more motor units rather than simply increasing their firing rate. Another preprint showed that movement during a learning task shifts memory consolidation from post-training to between trials, revealing a dynamic link between physical activity and learning.

Methods
Statistical modelling,
machine learning,
dynamical systems,
Bayesian inference

Model
Non-human primate
and rodent data,
computational models

Neural Dynamics

Statistical modelling of neural code and computation reflected in complex spatiotemporal neural activities

↑

We showed that the eXponential FAmily Dynamical Systems (XFADS) machine learning algorithm can learn the evolving pattern of brain states as a monkey makes arm-reaching movements toward different targets.

Our goal is to obtain an effective systems-level description of relevant neural dynamics in the context of cognitive functions and dysfunctions. Building on the foundations of dynamical systems and stochastic processes, we study the appropriate language for neural dynamics that can explain and generate specific predictions on neural data and behaviour. To arrive at a model of neural computation tightly tied to biology and experimental observations, we work closely with experimental and clinical collaborators.

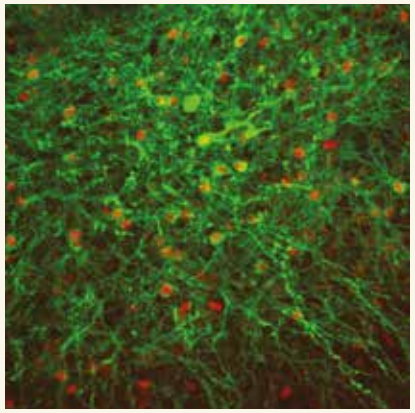
We develop methods for analysing spatiotemporal neural and non-neural time series, develop theories to distil a simpler understanding hidden in noise and idiosyncrasies, and provide data-driven evidence for and against scientific hypotheses. To facilitate the scientific inference process, we develop real-time machine learning and control methods and design next-generation experiments and tools to integrate information across heterogeneous recordings.

Principal Investigator Il Memming Park
Postdoctoral Researchers Matthew Dowling, Yves Bernaerts
PhD Students Ábel Ságodi, Ayesha Vermani, HyungJu Jeon
Technicians Carolina Filipe, Nico Espinoza
Intern Catarina Reis Dias

Highlights

We made significant conceptual advances in dynamical systems theory for interpreting neural dynamics. Our analysis of the robustness of short-timescale dynamics of an ideal neural computation suggests the need for a new descriptive framework. At the same time, we continued advancing neurotechnology for the analysis of neural recordings, enhancing our ability to predict longer time horizons in cognitive and motor tasks, infer internal states of the brain in real-time, and integrate data across multiple recording sessions without overlapping neurons.

Through interdisciplinary teamwork, we combined our theoretical insights, AI models, and computational tools to create interactive art pieces. Our real-time neural data sonification project was showcased at the *Metamersion: Healing Algorithms* exhibition and COSYNE, where we integrated a novel working memory model based on multiple oscillators, fast nonlinear state-space modelling, and real-time sonification feedback. This immersive experience provided a sense of “walking inside the brain”, as motion interacted with a dynamically evolving high-dimensional audiovisual signal generated from a simulated brain model and AI-processed representations.



Methods
Calcium imaging,
electrophysiology, viral tracing,
optogenetics, behaviour

Model
Mouse

Neuroethology

We are interested in understanding the neural circuits controlling sexual behaviour

↑

Thanks to an inserted light-sensitive protein, shining light on these cells in the hypothalamus, a deep brain region, can activate them, changing the sexual behaviour of female mice.

Sex is a fundamental aspect of nature, essential for species maintenance, evolution, and overall well-being. Despite its central role, the biological mechanisms underlying sexual behaviour remain poorly understood. Using both female and male mice, we aim to uncover the principles of sexual interaction that drive this complex behaviour. By employing state-of-the-art, genetics-based tools, we investigate the neural circuits that govern sexual dynamics, from initiation to completion.

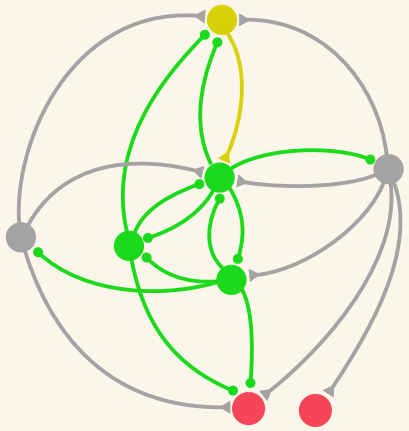
Principal Investigator Susana Lima
Postdoctoral Researchers Bertrand Lacoste (Co-Sup. C. Machens), Jonathan Cook, Margarida Dias, Nicolas Gutierrez
PhD Students Ana Rita Mendes, Inês Dias, Oihane Horno (Co-Sup. C. Machens)
Technician Liliana Ferreira

Highlights

Ana Rita Mendes received the *Trainee Professional Development Award* to attend SfN, where she presented her research on the neural control of ejaculation in male mice.

The lab published a *Journal of Neuroendocrinology* review exploring the ventromedial hypothalamus (VMH), a brain region involved in instinctive behaviours like mating, escaping predators, and territorial defense. The review highlights emerging evidence that VMH function varies along its anteroposterior axis, with new roles identified for its anterior subdivision in social defense.

Susana Lima also participated in the Science and Art Summer Camp organised by Science on the Walls and the Moinho da Juventude Association in Cova da Moura.



Methods
Behaviour, electrophysiology, optical imaging, connectomics, optogenetics, chemogenetics

Model
Fruit fly

Sensorimotor Integration

We study how circuits track self-movement and how this internal estimate shapes spatial awareness, learning, decision-making, and action selection during natural locomotion

↑

A visuomotor network for coordinate transformation and fast binary categorisation includes visual inputs (grey), recurrent and lateral inhibitory neurons (green), and divergent outputs targeting motor regions in the ventral nerve cord (red) and premotor areas in the brain (yellow).

Behaviour results from multiple movement control systems that are orchestrated based on an animal's current circumstances, goals, and experiences. However, how this coordination is organised within neural circuits across the central nervous system remains poorly understood. To investigate this, we analyse behaviour and neural activity to understand how the brain and body interact to support visually guided walking in adult flies as they explore novel environments and interact with conspecifics.

Principal Investigator Eugenia Chiappe
Lab Manager Nelia Varela
Postdoctoral Researchers Claire Rusch, Corinna Gebehart, Virginia Palieri
PhD Students André Marques, Miguel Paço, Nuno Rito
Visiting PhD Students Bella Xu Ying, Daniel Tendero
Research Assistants Filipa Torrão, Philine Oberhansberg, Sofia Pinto

Highlights

We launched our ERC-funded research on neural circuits for angular velocity estimation. To support this work, we expanded the lab and developed new experimental rigs, enabling high-precision studies of navigation in virtual environments.

Using optical imaging and whole-cell patch recordings, we began characterising genetically identified neurons in the premotor regions of the fly brain. These neurons serve as a hub, integrating motor, navigational and visual signals to support self-motion estimation and navigation.

Lab members participated in major international conferences, including Ascona, Brain Prize, FENS, COSYNE, and SfN, with Corinna Gebehart receiving awards for her work.

We also initiated new collaborations: with Barbara Webb (University of Edinburgh) to study neural control of flexible pursuit behaviours and with Brad Dickerson (Princeton University) to investigate neural circuits involved in saccade-related suppression in visual pathways.

Finally, we had a study accepted for publication revealing a compact network that processes optic flow to extract speed-invariant rotational information, enabling coordinate transformation and rapid binary categorisation. Stay tuned for the press release!

Methods
Theory, behaviour, electrophysiology, optogenetics

Model
Mouse, human

Systems Neuroscience

How the brain uses perceptual information to create and act on models of the world, and the role of confidence, uncertainty and neuromodulators in these processes

↑

Example of natural texture stimuli from a psychophysical study investigating how gaze shifts influence the perception of patterning and visual instability.

We seek to understand the principles underlying complex adaptive behaviour. Starting with quantitative observations of behaviour, we integrate cellular and systems-level experimental analysis of neural mechanisms within a theoretical and ecological context. Mice provide a flexible animal model that allows us to monitor and manipulate neural circuits using electrophysiological, optical and molecular techniques.

To extend these studies to humans, we are developing approaches to study naturalistic behaviour using tools such as virtual reality and artificial intelligence to create controlled yet realistic experimental settings. Our projects are diverse and continually evolving, with current research focusing on: (1) Serotonin signalling in adaptive behaviour; (2) Serotonin and the modulation of neural population activity states; (3) Dynamics of biological and machine learning; (4) Cognitive maps and latent state spaces; (5) Shared attention/experience.

Principal Investigator Zachary Mainen
Postdoctoral Researchers Davide Crombie, Razvan Sandru, Scott Rennie
PhD Students Inês Laranjeira (Co-Sup. D. McNamee), Giorgio Gristina (ICS-UL), Jaime Arlandis (Co-Sup. D. McNamee), Kcénia Bougrova, Zuzanna Dedyk, Solène Sautory (Co-Sup. L. Petreanu), Tiago Quendera (Co-Sup. A. Oliveira-Maia)
MSc Students Robert Bravo (ISCTE-IUL), Stefan Hadjuk
Technicians Laura Silva, Leonardo Leitão, Lydia Fettweis Neto, Magdalena Paluchowska, Margarida Duarte
Visiting Scientists Alireza Tavanfar, Anne-Lise Saive

Highlights

The lab published a study in *eLife* showing that the maturation of frontal cortical projections to the dorsal raphe nucleus between juvenile and adult stages enhances behavioural persistence in mice. Lab members also contributed to new publications from the International Brain Laboratory, a large-scale collaboration investigating the brain-wide basis of decision-making.

We launched the “Understanding Psychedelic Effects” project, combining phenomenological interviews and psychophysical experiments in naturalistic settings to study how psychedelics alter perception and cognition in humans. Experiments explored cross-modal effects in flavour perception, hallucination-like auditory percepts, and visual effects related to active vision dynamics. These findings will inform theoretical models of perception and cognition, as well as therapeutic applications, including digital interventions.

On the team front, we bid farewell to Eric Lacosse and welcomed postdoctoral researcher Davide Crombie, visiting scientist Anne-Lise Saive, and MSc student Robert Bravo.

Methods
Mathematical modelling, computational simulations

$$\dot{V}_i = -V_i + \sum_k F_{ij} x_k + \sum_j W_{ij} s_j \qquad V_i < T \qquad i \in [1,N]$$

$$W_{ij} = \sum_l E_{il} D_{lj} \qquad \dot{r}_j = -r_j + s_j(t) \qquad y_l = \sum_j D_{lj} r_j$$

$$\Rightarrow \dot{y}_l = -y_l + \sum_j D_{lj} I^{ss}\Big(\sum_k F_{jk} x_k + \sum_m E_{jm} y_m - T \Big)$$

$$N \to \infty,\ D_{ij} \to 0,\ D_{ij} \to D_l(y),\ E_{il} \to E_l(y)$$

$$\Rightarrow \dot{y}_l = -y_l + \frac{1}{\tau(y)} D_l(y) \qquad \tau(y) = \frac{\sum_m E_m(y) D_m(y)}{\sum_m E_m(y) y_m}$$

Model
Non-human primate data, rodent, zebrafish

Theoretical Neuroscience

We seek to understand how neurons interact to process information

↑

Mathematics explains planetary motion, electrical flow in metals, and phase transitions like water freezing into ice. In our lab, we use mathematics to understand how neurons compute through their interactions. This image showcases some of the formulas we have developed.

Our lab is interested in understanding how neurons communicate and process information. We study a range of systems, from the brain stem of the zebrafish to subcortical and cortical areas of the rodent and primate brains. We first analyse the activities of neuronal populations, based on recordings of 100s-10,000s of neurons, using modern data analysis tools such as dimensionality reduction. We then build models of neural networks that agree with these recordings. Finally, and abstracting further, we seek common principles of neural computations that apply to all of these very different brain circuits.

Principal Investigator Christian Machens
Postdoctoral Researchers Adrien Jouary (Co-Sup. M. Orger), Bertrand Lacoste (Co-Sup. S. Lima), Caroline Haimerl (Co-Sup. J. Paton), Francesca Mastroguiseppe, Matthijs oude Lohuis (Co-Sup. L. Petreanu), Raphael Steinfeld (Co-Sup. A. Renart), William Podlaski
PhD Students Gonçalo Guiomar, Guillermo Martin, Ildefonso Pica, Joana Carmona, Miguel Donderis, Oihane Horno (Co-Sup. S. Lima)
Technicians Vitor Paiva

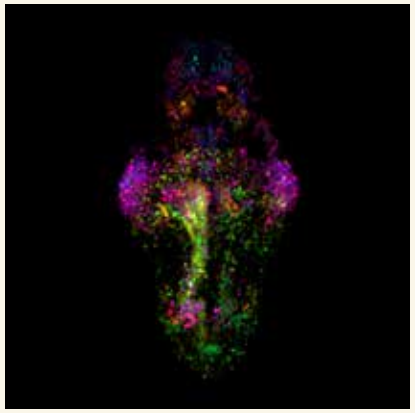
Highlights

The lab underwent a major transition. Oihane Horno and Gonçalo Guiomar successfully defended their PhD theses, while Severin Berger and Raphael Steinfeld moved on to roles in the biotech industry. At the same time, we welcomed new members: doctoral students Miguel Donderis and Guillermo Martín (INDP) and technician Vítor Paiva.

Lab members presented their work at top neuroscience and machine learning conferences. Adrien Jouary, William Podlaski, Caroline Haimerl, Francesca Mastroguiseppe, Guillermo Martin, and Joana Carmona attended COSYNE, with Haimerl and Podlaski also presenting at NeurIPS and Jouary at ICLR. Several projects reached publication, including Podlaski's work on visualising spiking neural network dynamics and Jouary's MegaBouts toolbox for high-throughput zebrafish behavior analysis.

The lab also organised multiple events. Haimerl, Mastroguiseppe, Carmona, and Matthijs oude Lohuis hosted a COSYNE satellite workshop on interarea communication, while Mastroguiseppe co-organised meetings on theoretical and mathematical neuroscience in Rome and Trieste.

Finally, we celebrated Haimerl, who received a prestigious *Transition to Independence Award* from the Simons Foundation.



Methods
Imaging, genetics, behaviour

Model
Zebrafish, giant danio, Danionella cerebrum

Vision to Action

Investigating the structure and function of whole-brain circuits underlying behaviour

↑

Brain-wide imaging in larval zebrafish revealed regions involved in short-term memory of visual cues. Each dot in the reconstruction represents the response of a neuron – colour-coded by depth – moments after a leftward-moving stimulus.

Our lab studies the rules governing neural circuit design and activity and their influence on behaviour, considering the brain as a whole. Using zebrafish, Danionella cerebrum and giant danio, we focus on how brains process sensory inputs, internal states, and experiences to select and execute actions.

Even simple behaviours engage widespread neural networks, making them difficult to decode. Zebrafish's small size, transparency, and genetic tractability allow for non-invasive whole-brain imaging and manipulation. Their brains share many features with complex vertebrates, including architecture, cell types, and circuit motifs. Early in life, zebrafish explore their environment and display instinctive behaviours like hunting, predator evasion and movement stabilisation. By combining computational behaviour analysis, whole-brain imaging, and genetic and optical neural circuit manipulation, we aim to understand the neural circuitry behind these behaviours.

Principal Investigator Michael Orger
Postdoctoral Researchers Adrien Jouary (Co-Sup. C. Machens), Gokul Rajan, Sabine Renninger
PhD Students Dean Rance (Co-Sup. G. de Polavieja), Elena Collins, Lucas Martins, Joaquim Contradanças, Pedro Tomás Silva, Thomas Mullen
MSc Students Catarina Matos, David Pereira, Gonçalo Oliveira
Technician Aaron Ostrovsky
Consultant Edite Figueiras
Research Associates Claudia Feierstein, João Marques, Ruth Diez del Corral

Highlights

The lab celebrated several new publications. In a collaboration between the labs of Ruben Portugues and Megan Carey, Rita Felix and Daniil Markov published a *Journal of Neuroscience* study on visual motion responses in the inferior olive.

Adrien Jouary and Thomas Mullen presented their work on dynamical systems modeling of behaviour using ILQR-VAE at the International Conference on Learning Representations 2024 in Vienna, alongside co-authors Marine Schimel, Guillaume Hennéquin and Christian Machens. Additionally, David Pereira, Catarina Matos and Gonçalo Oliveira all successfully defended their Master's theses.

Joaquim Contradanças received a Poster Award at the 18th International Zebrafish Conference in Kyoto, hosted by the International Zebrafish Society, and, on the outreach front, Thomas Mullen participated in the Science on the Walls summer camp programme.

Thomas Mullen participated in the Science on the Walls summer camp outreach programme and was awarded the Society for the Neural Control of Movement 2025 Diversity Scholarship.

Research Associates

CR's Research Associates are senior investigators who manage independent projects in association with particular labs at CR.

Claudia Feierstein

Neural Circuits for Visuomotor Behaviour

Associated with the Vision to Action lab

How does our brain use information to select appropriate behaviours? This is a question that can be addressed by looking at zebrafish larvae. Because they are small and transparent, we can easily peek into their brains non-invasively. Using state-of-theart microscopes, we can image the activity of the whole brain, and simultaneously track their behaviour. We can then ask: how can the larva's behaviour, or its sensory environment, explain the neuronal activity that we measure? In collaboration with the Theoretical Neuroscience Lab, we develop and apply analysis tools to understand what type of information is carried by populations.

Maria Luísa Vasconcelos

Innate Behaviour

Postdoctoral Researcher Nuno Machado
PhD Student Saheli Roy
MSc Student Sara Santos

To understand how neurons organise behaviour, we focus on reproductive behaviours. Reproductive behaviours are not only central to the survival of the species but also quite complex, providing insight into different levels of organisation. To address our questions, we use a combination of genetic manipulation, behaviour assays and calcium imaging in the fruit fly.

Eric DeWitt

Computational Cognitive Decision Science

Associated with the Systems Neuroscience lab

Our team uses computer models to study how humans and animals learn and make decisions. We focus on the role of neuromodulators, key players in learning and decision-making, and their influence on different brain areas. We hope this research will enhance our understanding of human behaviours and psychiatric disorders. In addition to this, we are fostering interdisciplinary collaborations, from psychiatry to artificial intelligence to hardware and software development. We believe this innovative approach is necessary to fully understand the brain and apply that knowledge to benefit health and society.

Ruth Diez del Corral

Development of Neural Circuits

Associated with the Vision to Action lab

We study how neural circuits form during embryonic development. Using transgenic zebrafish with fluorescent reporters and light-sheet microscopy, we follow and analyse the extension of neural projections in the embryo.

With the Vision to Action Lab, we are identifying the molecular profiles of neuronal subpopulations involved in visually guided behaviours in zebrafish, using immunohistochemistry and in situ hybridisation. Our focus is the diencephalon, a brain region that integrates and processes sensory stimuli, and transmits signals to areas controlling motor behaviours.

Adjunct and Visiting Scientists

In addition to the research labs, CR also has adjunct and visiting scientists, who work on complementary research areas.

John Krakauer

Cognitive-Motor Interface

Affiliation Johns Hopkins University
Visiting scientist since 2014

Our main areas of investigation are:
1. Experimental and computational studies of motor control and motor learning in humans;
2. Tracking long-term motor skill learning and its relation to higher cognitive processes such as decision-making;
3. Prediction of motor recovery after stroke;
4. Mechanisms of spontaneous motor recovery after stroke in humans and in mouse models;
5. New neuro-rehabilitation approaches for patients in the first three months after stroke.

Rui Oliveira

Social Neuroscience

Affiliations GIMM – Gulbenkian Institute for Molecular Medicine, ISPA University Institute for Psychological Social and Life Sciences

We study how social behaviour is shaped by biological mechanisms and how these, in turn, evolve. Our integrative approach spans multiple levels – from genes and neural circuits to behaviour and ecology – to explore both the immediate (proximate) and evolutionary (ultimate) causes of social behaviour.

Using model organisms like zebrafish and *Drosophila*, as well as ecologically relevant species such as African cichlids and cleaner wrasse, the team studies how social environments influence brain function, behaviour, and health. Collaborations with psychologists and psychiatrists also extend this work to humans, examining the health effects of social interactions – and of social isolation.

Methods
Genetic models, flow cytometry, cell/molecular biology, imaging, single-cell/spatial transcriptomics, computational biology

Model
Mouse

Cancer Dormancy and Immunity

We investigate what brings disseminated tumour cells in and out of dormancy, and how these dormant cells can be targeted

↑

UMAP plot depicting the distribution of different cell lineages in a mouse liver with disseminated breast tumour cells.

Our lab studies metastasis, the spread of cancer from the primary tumour to other body parts, which causes most cancer-related deaths. Metastases can emerge long after successful primary tumour treatment because disseminated tumour cells (DTCs) remain dormant at distant sites, awakening years or decades later to initiate metastases. This pause in cancer progression offers a therapeutic window to prevent future metastases.

We focus on breast cancer dormancy, which often spreads to bones, liver, lungs, brain, and lymph nodes. Our goal is to dissect DTC interactions with the unique microenvironment at each distant site, providing a roadmap of tissue-specific vulnerabilities for therapeutic exploration. We are especially interested in how immune cells, as first responders to tissue damage and DTCs, influence metastatic progression. Using multiple complementary approaches, we aim to develop strategies to prevent metastases from forming.

Principal Investigator Ana Luísa Correia
Postdoctoral Researchers Bruna Garcia, Miguel Fuzeta
PhD Students Andreia Gonçalves, Arjun Reeja
MSc Student Marta Amaro
Research Assistants Jennifer Murray, Margarida Braga

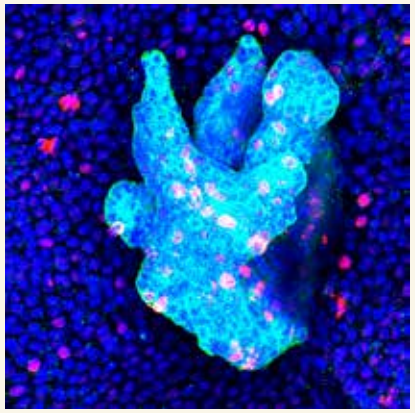
Highlights

We published a perspective in *Cancer Discovery* articulating key challenges and open questions in metastasis, the deadliest of all cancer hallmarks, while our review in *Trends in Cancer* explored how metabolic adaptation to the host environment impacts DTCs' ability to thrive as a metastasis.

Our lab received a *la Caixa Health Research Grant* to study when and where liver and bone microenvironments change to support breast cancer metastasis. This collaborative project with Neta Erez (Tel Aviv University) also involves a multidisciplinary team from CCC's Breast and Digestive Units, Radiology, and Pathology.

Together with Carlos Minutti and Klaas van Gisbergen, Correia chaired the CR Symposium on the Ecology of Cancer, exploring cancer initiation and progression within a broader biological context. Correia also participated in "Broken Phone" on European Researchers' Night, engaging the public in science across all ages.

We proudly celebrated Andreia Gonçalves's FCT PhD Fellowship and our first Master's thesis by Marta Amaro. We also welcomed new team members – Arjun Reeja and Jennifer Murray – who will contribute to our mission of better understanding and treating metastatic breast cancer.



Methods
Genetic tractable organisms, imaging, cellular biology, genetics, flow cytometry

Model
Mouse

Cancer and Stem Cell Biology

We study the cellular and molecular mechanisms that drive cancer formation and progression

↑

Image of a basal cell carcinoma (green) showing expression of Survivin (red).

Our lab investigates the cellular and molecular mechanisms that drive cancer formation and progression, with the ultimate goal of developing new therapies that target these processes.

We study the role of tumour cells in cancer formation by developing novel, state-of-the art genetic mouse models. Our research focuses on both common adult cancers, such as basal cell carcinoma, and paediatric cancers, including neuroblastoma and medulloblastoma.

Additionally, we examine how the tumour microenvironment interacts with cancer cells to influence tumour formation and therapy response, using melanoma – the deadliest form of skin cancer – as a model.

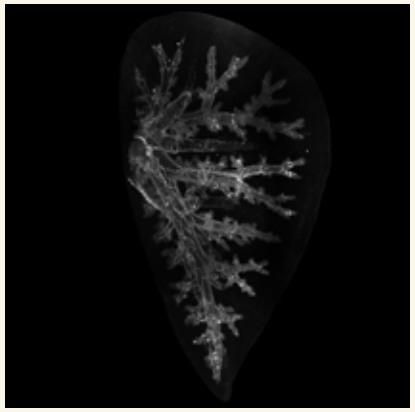
Principal Investigator Adriana Sánchez-Danés
Lab Manager Raquel Soares
Postdoctoral Researchers Ana Lúcia Rebelo, Sara Canato
PhD Students Adrianna Bielowka, Ana Martins, Angelina Sanderson , Sara Ferreira, Sofia Marques
Technician Patricia Borges

Highlights

We published a major study in *Cancer Discovery*, where we identified a novel driver of basal cell carcinoma, the most common skin cancer in humans. We found that the gene Survivin is essential not only for initiating this cancer but also for the progression of preneoplastic lesions into invasive tumours.

We were awarded the highly competitive *Fight Kids Cancer Grant*, one of the largest European paediatric cancer grants. Sánchez-Danés is coordinating this consortium-based project, bringing together teams from Portugal, Germany and Spain to develop the first models of Group 4 Medulloblastoma, one of the most common paediatric brain cancers.

We are also proud to share that Sánchez-Danés won the Liga Portuguesa Contra o Cancro Award 2024. Additionally, she co-organised, alongside Joe Kissil (Moffitt Cancer Center), the first PT-US Cancer Summer Course at CF, which brought together students and American and Portuguese faculty for an unforgettable scientific event.



Methods
Genetically tractable organisms, flow cytometry, cellular biology, molecular biology, imaging

Model
Mouse

Immunophysiology

Neuroimmune interactions in the prevention and resolution of disease

↑

3D projection of whole-tissue imaging showing sympathetic fibres innervating the mouse lung.

We explore the role of cross-talk between neurons and the immune system in the prevention and resolution of disease. To that end, the team focuses on organs that have a complex and dense network of neuronal and immune cells, including the intestine, lung and pancreas. This combination of features makes these organs an optimal site to reveal how the neural and immune systems work together to preserve health.

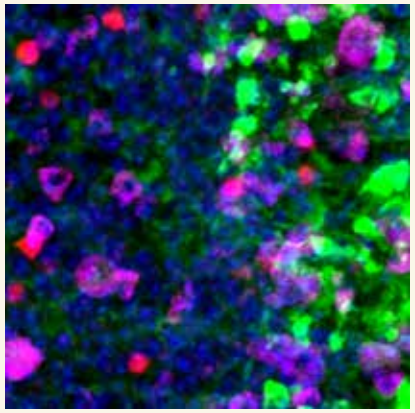
Using this approach, the lab has been exploring the surprising role of the neural network that surrounds these organs: immune regulation. The team discovered that while the immune system actively fights infection and cancer, it is the neurons that detect the invasion of tumour cells, setting the immune response in motion. These findings may have tremendous potential in the design of novel therapeutic approaches to disease as they pinpoint new selective targets that can be harnessed in infection, metabolic disorders and cancer.

Principal Investigator Henrique Veiga-Fernandes
Lab Manager Hélder Ribeiro
Postdoctoral Researchers Cristina Godinho da Silva, Jaechan Ryu, Maria Aliseychik, María Martínez, Patrícia Bastos, Roksana Pirzgalska
PhD Students Ana Rasteiro, Eric de Sousa, Kristin Fischer, Miguel Rendas, Raquel Silva
MSc Students Livia Patrizi, Madalena Pereira
Technicians Beatriz Alves, Bruno Raposo, Inês Godinho, Maria Bettencourt

Highlights

We launched two major EU-funded projects addressing both translational and fundamental research questions. Henrique Veiga-Fernandes was awarded an *ERC Advanced Grant* to investigate neuroimmune interactions in peripheral organs, while a *Horizon Mission Cancer* project focuses on neuroimmune regulation in liver cancer.

Additionally, our lab co-authored two significant publications in *Nature and Nature Immunology*, highlighting how the immune system shapes metabolism. The *Nature* study reveals that immune cells in fat tissue follow a daily rhythm, producing IL-17 at night to regulate fat storage, linking immune cycles to metabolism. The *Nature Immunology* study shows that during viral infections, the immune system lowers blood sugar to boost antiviral defences, but high blood sugar – such as in diabetes – can impair this response.



Methods
Genetics, transcriptional profiling,
lineage-tracing, imaging,
cell biology, behaviour

Model
Fruit fly, mouse

Stem Cell and Regeneration

We study regeneration and stem cell activation as a gateway to understanding cancer formation and tissue repair

↑

Expanding glioblastoma cells in the adult fruit fly brain. Green indicates invading glial processes, while red highlights enlarged, actively dividing cell bodies.

We use tissue damage and the resulting release of growth signals to explore how normally dormant stem cells switch to an active, dividing state – either regenerating tissue or, if misregulated, driving tumour formation.

Our lab focuses on brain damage due to its profound health consequences and the brain's limited regenerative capacity. Regeneration and cancer share key signalling pathways, as both rely on rapid cell proliferation, energy supply, inflammation, and extracellular matrix remodelling. While regeneration temporarily activates these processes, cancer hijacks them long-term to sustain tumour growth.

Taking advantage of our genetically tractable fly model, we recently discovered that reactive oxygen species, which accumulate in injured tissue, play a crucial role in triggering cell division by modulating stress signalling pathways.

Principal Investigator Christa Rhiner
Postdoctoral Researchers Anabel Rodriguez, Ana Cristina Ojalvo, Catarina Dias, Juan Sánchez, Victoria Canal
PhD Students Margarida Caio, Catarina Costa (Co-Sup. E. Moreno)
Technicians Beatriz Ferreira, Carolina Alves

Highlights

Our ongoing research has identified a secreted factor that shapes the extracellular space for proliferation, playing a dual role in both regeneration and tumour formation. We demonstrated that targeting this molecule can restrict tumour growth in an aggressive glioblastoma fly model, while increased levels enhance regeneration. Future experiments will explore its underlying mechanism of action.

With support from the *ERC-Portugal Grant* from FCT, we have implemented advanced protein tagging technology to trace the effects of pro-regenerative factors in distant organs.

Several team members made significant contributions. Juan Sánchez was awarded a Human Frontier Science Program postdoctoral fellowship to develop novel tools for visualising and manipulating the dynamic stem cell environment. Anabel Rodriguez spoke at the Iberian Glial Network Symposium and won a prize for her poster at the CR Symposium. We also welcomed Ana Cristina Ojalvo and Victoria Canal, whose expertise further strengthens our team.

Methods
Flow cytometry, single-cell RNA sequencing, microscopy, spatial transcriptomics, genetic lineage tracing, intersectional genetics

Model
Mouse, zebrafish

Immunoregulation

Our lab studies conventional dendritic cell functional heterogeneity: ontogenically committed or environmentally plastic?

↑

Using RNA velocity, a bioinformatics tool for inferring temporal dynamics in single-cell gene expression, we predict the developmental trajectories of different cDC types from the bone marrow to peripheral tissues.

The adaptive immune response relies on conventional dendritic cells (cDCs), which detect tissue disturbances and induce various immune responses – sometimes counterproductive, as in cancer. How cDCs determine the appropriate response remains unclear.

Research by Carlos Minutti shows that different cDC progenitors originate in the bone marrow, which may influence their functions in peripheral tissues. Consequently, our lab is exploring how tissues under attack (from infection or cancer) communicate with the bone marrow – likely via the blood or nervous system – to influence cDC production.

We are also developing advanced mouse models to test the hypothesis that different cDC types are needed to trigger specific adaptive immune responses, which can be either protective or harmful. We propose that the communication between the affected tissue and bone marrow fine-tunes cDC production and determines the type of adaptive immune response.

Principal Investigator Carlos Minutti
Postdoctoral Researchers Maria Iliopoulou, Sahar Tehrani
PhD Student Robert Baber
Research Assistants Miguel Patrício, Vasco Correia

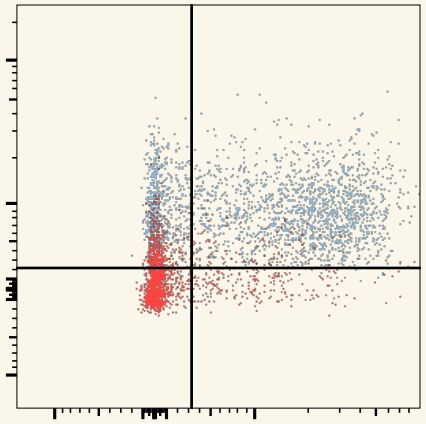
Highlights

Our lab was awarded the *EHA Kick-Off Grant* and applied for two la Caixa Foundation projects in collaboration with groups from Spain (University Complutense of Madrid, University of the Basque Country) and the UK (The Francis Crick Institute) to explore the translational potential of our research.

We also established a new consortium with CABIMER (Seville) and Nanyang Technological University (Singapore) to investigate how nutritional sensing in the bone marrow, particularly the role of fatty acids, influences dendritic cell development and immune regulation.

We welcomed postdoc Kyle Cunningham, and published two key studies: one in *Science* on how vitamin D regulates microbiome-dependent cancer immunity, and another in *Nature Immunology* on how distinct developmental lineages shape cDC2 heterogeneity.

Minutti is leading MexaLink, a global initiative connecting Mexican PhD students with research labs abroad to foster collaboration and skill-sharing. He also co-organised CRSy24 – The ‘Ecology’ of Cancer, a symposium focused on cancer-host interactions.



Methods
In vivo tumour models,
in vitro culture, flow cytometry,
fluorescence microscopy,
transcriptomics

Model
Mouse

Tissue Immunity

Defining developmental pathways and instructive cues of T cells that arise in local tissues after infection or at the tumour site

↑

Flow cytometry plots showing
two types of immune cells,
called T cells, that have infiltrated
the tumour.

We focus on the differentiation and activation of T cells, essential for specific immune responses against infections and cancer. Understanding their function is key to advancing cancer immunotherapies. Recent findings emphasise the importance of tumour-resident T cells in combating tumour growth, making their development and function a vital area of study.

Our lab identified critical transcriptional regulators for the differentiation of resident memory T cells in local tissues, establishing them as an independent lineage. We have developed tools to observe and manipulate these cells, shedding light on their development in peripheral tissues and response to antigen rechallenge. Additionally, we discovered mechanisms that temper their proinflammatory activity, which may help to protect healthy tissues.

Given their crucial role in opposing tumour growth, our current research aims to understand the development of resident memory T cells within the tumour site.

Principal Investigator Klaas van Gisbergen
Research Associate Inês Ramos
Postdoctoral Researcher Daniela Silva
PhD Students Maria Keridon, Raquel Sequeira
MSc Student Nguyen Phan
Technicians Helena Silva, Lynn Vermeer, Manuel Jacinto, Sara Correia
BSc Student Catarina Sena

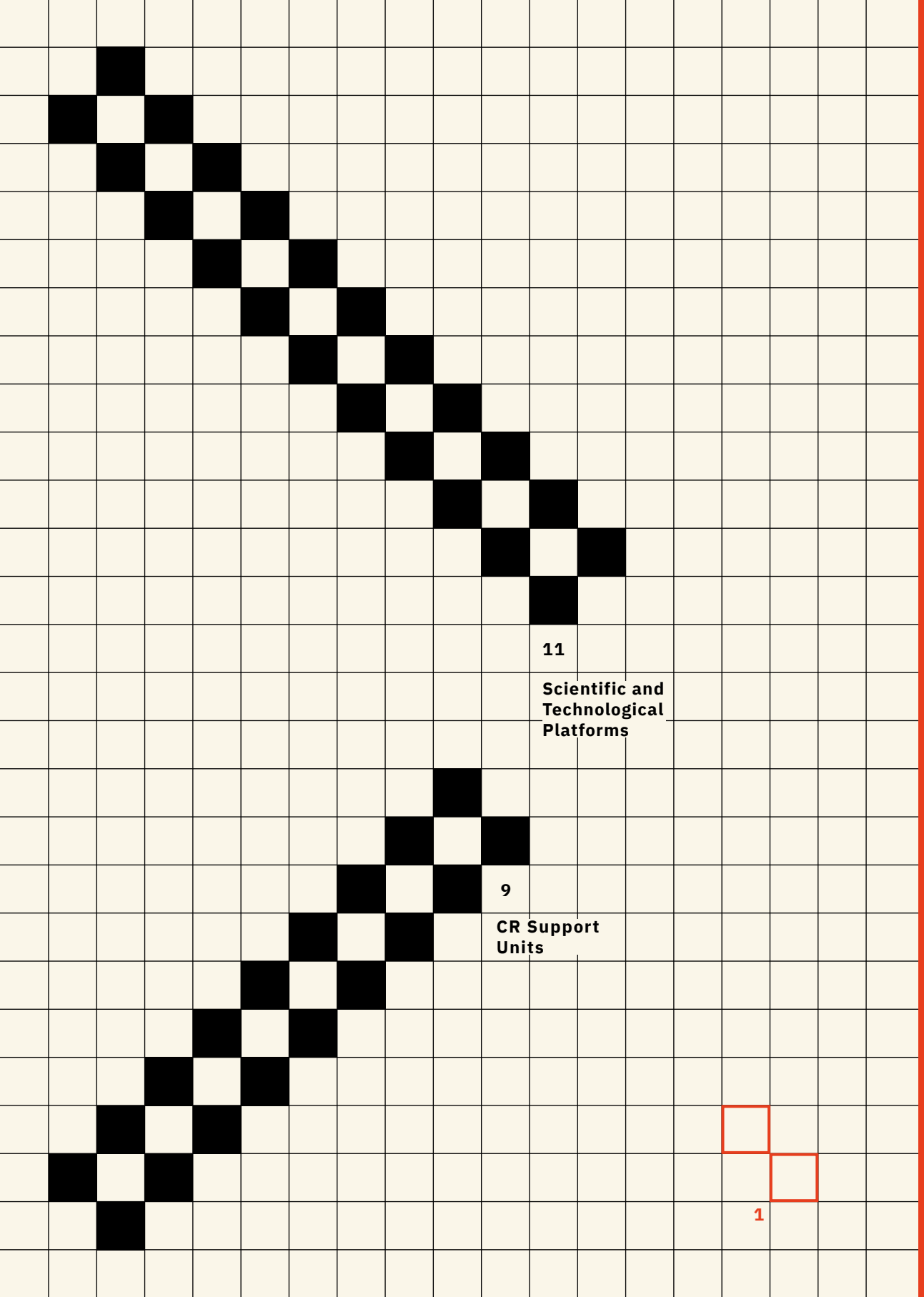
Highlights

Our research group studies how T cells respond to tumours and infections, focusing on the signals that guide their differentiation and lineage choices.

We strengthened collaborations with Thorbald van Hall (Leiden UMC) and Joke den Haan (Amsterdam UMC) to study T cells in *in vivo* tumour models. We also launched new projects: one on a T cell-based cancer vaccination strategy, funded by KWF (Dutch Cancer Society), and another on T cell lineage relationships, supported by a Vici fellowship from ZonMw (Netherlands Organization for Health Research and Development). Additionally, Ines Ramos secured an FCT exploratory grant to study inhibitory receptors using optogenetics.

Our team played an active role in the CR Symposium, which focused on tumour immunology, and we are currently organising the 2025 Annual Meeting of the Portuguese Society of Immunology, to be hosted at CF.

We also welcomed five new team members: postdoc Daniela Silva, PhD student Raquel Sequeira, technicians Manuel Jacinto and Helena Silva, and MSc student Nguyen Phan.



The work of CR investigators is supported by two structures: the Scientific and Technological Platforms, which handle technical aspects of research, and the CR Support Units, which provide administrative services.

Research Support

Scientific and Technological Platforms

The Scientific and Technological Platforms consist of eleven individual units that support the work of researchers and clinicians at CF. The platforms operate across a wide range of areas, from the development of sophisticated technologies in animal and cellular models, imaging tools, hardware and software, to managing resources and research infrastructures.

Advanced BioImaging and BioOptics Experimental

The Advanced BioImaging and BioOptics Experimental (ABBE) Platform supports CF researchers with high-quality microscopy data. It assists users throughout the imaging pipeline – from project discussions and technical training to image processing, analysis, and visualisation.

Managed by an international team with backgrounds in Biophysics and Physics, ABBE offers expertise across a range of modalities, from light-sheet to super-resolution microscopy, enabling multi-scale imaging from protein interactions to whole organisms. The team also represents the Foundation internationally, liaising with microscopy companies on equipment maintenance, service, troubleshooting, and long-term partnerships.

Coordinator Davide Accardi
Microscopist and Imaging Specialists Anna Pezzarossa, Pedro Campinho
PhD Student Camila Sarmiento Betancourt (Co-Sup. NOVA IMS)

Highlights

The year 2024 marked a milestone for the ABBE Platform, which not only kept the institute's imaging capabilities at the forefront but also successfully launched the first edition of the "Advanced Course on the Principles of Light Microscopy". This national-level training programme was organised in collaboration with ZEISS, the Imaging Experts of Lisbon-Oeiras, and the Max Planck Institute in Dresden.

The course offered participants in-depth theoretical and practical training in image formation and microscopy – from light sources to detectors – through a mix of lectures, demonstrations, and hands-on sessions. Its unique format featured ten expert instructors, ten microscopes, and twenty participants, ensuring a highly interactive and personalised learning experience.

In addition to expanding participants' knowledge, curiosity, and career opportunities, the course fostered valuable national and international connections, bridging academia and industry in the field of microscopy.

Biophotonics

The Biophotonics Platform focuses on the development of innovative optical tools and methods for clinical applications. Our goal is to provide clinicians with effective diagnostic tools to aid in decision-making, ultimately enhancing early cancer detection, intraoperative margin assessment, and posttreatment monitoring. While our activities focus predominantly on clinical collaborations, we remain open to establishing future partnerships with CR groups.

Our multidisciplinary team brings together expertise in engineering, physics, biochemistry, and medicine. Our activities are closely coordinated with the various clinical units and the Pathology Service at the Champalimaud Clinical Centre, ensuring a strong connection between research, technological advancements, and clinical practice.

Coordinator João Lagarto
PhD Student Alberto Ignacio Herrando

Fish

The Fish Platform (FP), established in 2011, provides a state-of-the-art facility for housing and breeding of fish models under high health and welfare standards. With a team of two senior PhD scientists and six research, aquaculture, and animal technicians, it offers a full range of services – including complex line maintenance, generation of transgenic and gene-edited fish, and assisted reproduction – tailored to the needs of the scientific community through close collaboration with researchers.

While primarily serving CR, the FP also supports and collaborates on national and international projects. With a strong focus on scientific and technological advancement, it has contributed to several collaborative projects, a patent, and over ten peer-reviewed publications, earning substantial international recognition.

The platform also provides consulting on zebrafish facility set-up and management, along with training and technology transfer.

Coordinator Ana Catarina Certal
Platform Manager and Senior Scientist Joana Monteiro
Aquaculture Technicians Dionísio Sousa, Joana Castro
Animal Technician Oroquia Sokhona
Research Technicians Inês Gonçalves, Inês Oliveira, Pedro Seco

Highlights

The group served as an expert auditor in facility management for the International Institute of Molecular and Cell Biology in Warsaw, the leading biomedical institute in Poland. Additionally, the team contributed to an invited book chapter, reflecting their continued engagement with the broader scientific community.

Joana Monteiro developed and taught the science workshop “Scientist Returns to School” for 3rd and 4th grade students in Mourão, Portugal, in partnership with Native Scientists. She and Inês Oliveira also took part in the European Researchers' Night at Oeiras Harbour, engaging the public with science outreach activities.

Flow Cytometry

The Flow Cytometry Platform is equipped with state-of-the-art equipment, enabling our team to offer optimal solutions to researchers both within and outside our institution. Alongside research equipment, we possess specialised devices used by clinical haematologists for diagnosis and clinical assays. Our advanced equipment can characterise single cells at rates of thousands per second, with select devices capable of physically isolating specific cell populations for in-depth analysis.

We provide comprehensive training covering a wide range of areas – from the fundamental principles of flow cytometry and experimental design to hands-on instrument operation and sophisticated multiparametric data analysis.

Coordinator Pedro Garcia da Silva
Group Head André Mozes
Flow Cytometry Specialist Íris Ramos

Highlights

As part of the FLxFlow network, the Flow Cytometry Platform played a central role in organising the 5th edition of the “Principles and Applications of Flow Cytometry” course, held at GIMM. The event brought together a diverse group of researchers from the Lisbon region and abroad for a week of intensive training, which received very positive feedback.

A key highlight this year was the organisation of Portugal’s first Spectral Day. This event significantly advanced the research community’s understanding of spectral flow cytometry and featured high-quality international speakers, marking a milestone for the field in the country.

The platform also enhanced its technological capabilities with the installation of the SONY ID7000 spectral flow cytometer – the first of its kind in the Iberian Peninsula. With five lasers and 147 fluorescent detectors, this powerful instrument enables researchers to extract significantly more information from each sample, accelerating project timelines.

On the international front, the platform participated in CYTO 2024 (ISAC) in Edinburgh, where technical improvements developed by the team were presented and discussed in poster format.

Fly

The Fly Platform offers state-of-the-art conditions for breeding, upkeep and manipulation of fruit flies, accessible to both CR researchers and external users. Beyond overseeing all shared equipment and spaces, the platform’s staff provide a range of technical services. These include core tasks such as medium production and stock maintenance, as well as more technically demanding procedures, namely organ dissection, staining, embryo microinjection and the creation of transgenic lines.

Coordinator Isabel Campos
Manager Liliana Costa
Technicians Ana Reis, Carina Monteiro, Catarina Craveiro, Patrícia Valentim, Susana Matos

Highlights

In February, we took part in RAISE’s “Ciência di Noz Manera” programme, offering hands-on experience to numerous young aspiring scientists. We also hosted visits from five schools, providing demonstrations and additional support for school-led experiments.

In collaboration with the Instituto Politécnico de Setúbal, we offered two internships as part of its 3rd-year BSc in Biotechnology. Interns Leonor Pacheco and Francisco Lima spent three months working with our team, gaining valuable experience while developing independent projects of broad interest to the fly research community.

Lastly, we bid farewell to our dear friend and former colleague Zichiena Zovo, and were delighted to welcome Susana Matos as the newest member of our team.

Glass Wash and Media Preparation

Glass washing and media preparation are core functions essential to the operation of any research institution. The Glass Wash and Media Preparation Platform (GWMPP) supports CF investigators and laboratories by providing sterilised labware – including glassware, plastics, and instruments – and by preparing high-quality tissue culture and bacteriological media required for standard research protocols.

Coordinator Cátia Feliciano
Head Maria José Vito
Technicians Diogo Martins, Madalena Martins, Soraia Rodrigues

The GWMPP delivered daily services to new CR Labs and the Botton-Champalimaud Pancreatic Cancer Center Programme, in addition to supporting established CR Labs and Platforms, along with three Champalimaud Clinical Centre units: Nuclear Medicine, Pharmacy and Radiation Oncology Services. Our team continued to diligently adhere to procedures and protocols and maintain records to ensure the safety and efficiency of our operations.

Hardware and Software

The Hardware and Software Platform supports scientific and technological innovation at CF by providing expertise in the design and development of new applications in electronic, robotic, software, and mechanical engineering.

Our multidisciplinary team collaborates closely with researchers and clinicians to create technological solutions for advanced research and health services.

We offer comprehensive hardware and software development services, covering requirement analysis, design, development, implementation, validation, and testing. We support CF members with 3D printing, custom electronic hardware, and management of both the electronic and mechanical workshops. Additionally, we contribute to open-source projects and share developments with the broader research community.

Coordinator Artur Silva
Hardware Developers Artur Silva, Filipe Mendes, Paulo Carriço
Hardware Technicians Dario Bento, Mário Inácio
Software Developers Beatriz Lourenço, Luís Teixeira

Highlights

This year was marked by key innovations, research contributions, and international outreach. Collaborations with research groups culminated in the publication of three peer-reviewed articles and one preprint, further highlighting the scientific value of our in-house hardware and software solutions to the scientific community.

We continued to develop new tools and devices, notably a state-of-the-art odour delivery system with broad potential applications in neuroscience and sensory research. Globally, our technologies gained further traction, with research labs and institutions around the world adopting our tools. They were also successfully showcased at the Society for Neuroscience 2024 conference.

A highlight of the year was co-hosting the prestigious Vision Award ceremony alongside Wingy the robot, reflecting our continued commitment to AI and robotics in science and innovation. Another major milestone was the production and deployment of holonomic robotic recliner chairs in CF patient rooms, offering new mobility solutions in healthcare settings.

Histopathology

The Histopathology Platform provides a number of high-quality services to the CF scientific community, including: fit-for-purpose histological procedures for specific experimental questions and appropriate methods for collection, fixation and analysis; preparation of biological samples for routine or special procedures; training of CF members; drawing up written reports and supporting manuscript/grant preparation.

Coordinator and Experimental Pathologist Tânia Carvalho
Histotechnicians Maria Inês Romano, Raquel Quitéria, Sérgio Casimiro
Digital Pathology Scientist Mariana Monteiro

Highlights

The Histopathology Platform provided experimental and translational pathology support to both in-house and external research groups, contributing significantly to numerous studies in oncology, ageing, neuroscience, and immunophysiology. We co-authored various publications in *Nature, Cell Reports, Investigative Radiology, eLife* and *Fluids and Barriers of the CNS*, exploring diverse themes including neuro-immune interactions in metabolic disease; the use of non-invasive MRI biomarkers for diagnosing pancreatic intraepithelial neoplasia; early detection of Alzheimer's disease; the characterisation of brain tumour heterogeneity; and the role of telomerase in melanoma, using a zebrafish model.

The platform specialised in conducting comprehensive necropsy studies for complex ageing and carcinogenesis research. We invested heavily in AI-driven image analysis to quantify patterns and cellular characteristics, and organised and lectured in the QuPath course for image analysis with the Portuguese Society of Animal Pathology. These initiatives strengthened our capacity for advanced biomedical research at the Foundation, ensuring rigorous and innovative tissue analysis.

Molecular and Transgenic Tools

The Molecular and Transgenic Tools Platform (MTTP) specialises in molecular cloning, gene editing, genotyping, and viral production, providing cost- and time-efficient end-to-end services – from design to delivery. Staffed by three PhD scientists and four technicians, MTTP supports diverse applications – from complex KO/KI constructs to advanced viral systems – leveraging state-of-the-art technologies.

Equipped with a fully certified BSL2+ laboratory for viral vector production, the platform also handles genotyping for all in-house animal models. While primarily serving CR, MTTP also collaborates with academic and industry partners. It supports CF PhD programmes, hosts an annual Hands-on Molecular Tools Workshop, and played a key role during the COVID-19 pandemic by providing testing services for the Foundation.

As a managing committee member of the European network CorEuStem, MTTP is a key resource for advancing research involving molecular and cellular tools.

Coordinator Ana Catarina Certal
Platform Manager and Senior Scientist Ana Raquel Tomás
Senior Research Technician Marta Barbosa
Research Technicians Ana João Martins, Catarina Miranda, Hugo Lopes, Renato Ferreira

Highlights

The MTTP held the third edition of its "Hands-on Molecular Tools" course – a crash course for beginners on the fundamentals of molecular biology and genetic engineering – in collaboration with FCiências and CE3C. Over five days, the platform hosted 14 participants from various institutions, ranging from biological and biomedical scientists to medical doctors and clinical technicians.

Multimedia

The Multimedia Platform produces a wide range of content CF, including institutional videos and tailored productions for scientific, medical, preclinical, and clinical projects. It also creates content for social media, research method videos for scientific publications, and clinical procedure videos for educational and training purposes.

In addition, the platform develops promotional videos for outreach and internal events, and provides photography for communication materials – such as group photos, staff portraits, and architectural images – and manages an up-to-date multimedia archive for use across social and mainstream media, press releases, and institutional events.

Coordinator Pedro Garcia da Silva
Multimedia Producer Alexandre Azinheira

Highlights

Over the past year, the Multimedia Platform produced a collection of institutional videos covering all areas of CF. It also launched a new video series designed to educate both clinic patients and the general public about technological and procedural advances in medicine – further reinforcing the Foundation's commitment to cutting-edge research, medical education, and exceptional patient care.

Rodent

The Rodent Platform ensures the welfare and veterinary care of all CR rodent models, complying with European and national regulations, as well as welfare guidelines. Our team oversees shared facilities, provides daily care for animals, supervises their use in scientific research, and offers specialised services including colony management, assisted reproduction, and contract research, among others. Additionally, the Rodent Platform staff play a key role in the institutional Animal Welfare Body (ORBEA) and in training researchers in laboratory animal science.

Coordinator Isabel Campos
Animal Welfare Officer Rute Marques
Veterinarian Catarina Carvalho
Operational Manager João Pereira
Service Manager Ana Vaz
Colony Managers Ana Rita Pereira, Erineo Silva, Filipa Franco, Irina Moreira, Laura Carvalho, Rodolfo Águas
Animal Health and Welfare Technicians Bruno Novais, Sara Oliveira
Assisted Reproduction Technicians Ana Rita Pereira, Catarina Craveiro
Animal Technicians Alexandre Leite, Pedro Franqueira, Wilcilaya Pontes
Technicians João Rodrigues, Kevin Montrond, Rodrigo Santos

Highlights

We bid farewell to our friend and colleague Dolores Bonaparte, who served as the CF Vivarium Veterinarian for seven years. Catarina Carvalho, a trained veterinarian and team member since 2021, stepped into the role of Designated Veterinarian. Veterinary work and responsibilities have been further strengthened by the addition of our new colleague Rute Marques, who joined as the dedicated Animal Welfare Officer. In this role, Rute contributes to regulatory compliance, training, ethical oversight, and the refinement of animal procedures, ensuring best practices in animal care and welfare.

In line with the Vivarium's transparency policy, we participated in several outreach initiatives focused on the use of animals in scientific research. These included the online campaign #BOARD24, the European Researchers' Night, and the 1st Open Week on Animal Experimentation in Portugal, organised by the European Animal Research Association, among other activities.

The nine CR Support Units (CRSU) are responsible for providing comprehensive administrative and operational assistance, including budget and financial management, purchasing, procurement, and services within the people and culture area. Accompanying the evolution and growth of CR, the support provided to CR's scientists also continuously grows in organisation and capacities.

CR Support Units

The vision of the CRSU is to be an exemplary resource in the field of research management and administration by providing tools and exceptional support to enhance the work of scientists, maximising their time spent in research.

Communication, Events and Outreach

In every initiative – whether a symposium, an online campaign, or a researchers-in-schools programme – the Communication, Events and Outreach (CEO) team serves as a vital bridge between the transformative research conducted at CF and society at large. By promoting scientific literacy and public engagement with science, while nurturing the internal community and enhancing CF's visibility and recognition, the CEO team plays an essential role in fulfilling the Foundation's mission: not only to produce excellent science, but to make it meaningful and accessible to all.

Coordinator (Science Communication and Outreach) Catarina Ramos
Coordinator (Institutional Communication and Events) Teresa Fernandes
Science and Community Events Coordinator António José Monteiro
Events and Digital Managers Ana Rita Mendes (maternity leave), Diana Cadete
Science Writer and Content Producer Hedi Young
Communication Consultant John Lee
Designers Carla Emilie Pereira, Marta Correia
Audiovisual Technician and Sound Designer João Van Zelst

The CEO team delivered a diverse programme of events, communications, and outreach. Scientific exchange and community connection were fostered through flagship events such as the CR Retreat, Annual Symposium, the return of the CR Colloquia Series, and major international gatherings like the International Congress on Neurodegenerative Diseases. Meanwhile, initiatives like *Metamersion – Healing Algorithms* explored new ways of showcasing science at the intersection of research, art, and technology.

The team also created compelling digital content and campaigns to make science more accessible. The interactive online series *WAILA – What Am I Looking At?* reached over 150,000 viewers with its blend of visuals, narration, and interactivity. Campaigns such as *Women & Girls in Science* and *BeOpen About Animal Research* promoted equity and ethics in science.

Outreach initiatives engaged wide-ranging audiences – from school visits and public events to the *Ciência di Noz Manera* mentoring programme, which paired 60 scientists with 200 students from underserved schools. Internally, the CEO team cultivated a sense of community through celebratory moments including Operation Kite, the Magusto, and a collaborative Winter Card Happy Hour.

Direction Support

The activities of the CR Direction require extensive organisational, executive, and communication support to ensure effective interaction with all CR stakeholders, as well as with the Champalimaud Clinical Centre and the CF Board. The Executive Assistant (EA) plays a key role in supporting these activities, facilitating the swift and efficient response of the Direction and ensuring smooth information flow in both directions.

The EA enables the Directors to remain actively involved in the daily operations of CR while managing their full schedules as Principal Investigators. In parallel, the EA also leads specific projects prioritised by the Direction in line with CR's strategic goals. These projects often involve close collaboration with Support Units and other stakeholders across the Foundation.

Executive Assistant to the Direction Inês Soeiro

Highlights

The EA is responsible for organising the Champalimaud Foundation's annual Scientific Advisory Board (SAB) meeting, which brings together leading experts in neuroscience and cancer to evaluate the research programme and selected research groups. In 2024, the SAB meeting hosted seven permanent members and one ad-hoc member, who reviewed four research groups over the course of a two-day meeting held on 19-20 November.

Fellows Support Office

The Fellows Support Office provides comprehensive human resources support to the Champalimaud Foundation's research community, covering everything from recruitment to maintaining connections with former members. In close collaboration with Human Resources (HR) and other CF support units and platforms, we work to ensure the Foundation meets its commitments to researchers. We continuously refine HR policies, processes, and procedures to streamline operations and enhance the experience of our researchers. Our priority is to promote the success and well-being of all researchers and staff, fostering a nurturing and respectful working environment.

Coordinator Teresa Carona
Assistant Pedro Alves

Highlights

We actively supported our research community by processing 143 official statements and declarations, 183 onboarding requests, 45 offboarding processes, and over 100 liaisons with Portuguese government offices. Throughout the year, we continued to improve HR policies and procedures. Looking ahead, we remain dedicated to expanding mentorship, networking opportunities, and professional development resources to further strengthen support for all our researchers and staff.

Graduate Studies Office

The Graduate Studies Office (GSO) is dedicated to enriching the postgraduate educational experience, engaging not only students but the entire community. Our mission extends beyond PhD support to include healthcare professionals, researchers, and the broader scientific community, with the goal of promoting translational research that advances medicine. We strive to create a learning environment that fosters the exchange of ideas and experiences – essential for academic and professional growth.

Our vision is to promote academic excellence and encourage collaboration across disciplines. We believe that a dynamic, interdisciplinary environment is key to driving innovation, creativity, and critical thinking, and we aim to ensure students feel supported while reaching their full potential.

By cultivating a welcoming and stimulating atmosphere, we foster a culture of excellence and innovation that contributes to scientific breakthroughs and transformative progress in public health and medicine.

Director of Education Isabel Palmeirim
GSO Coordinator Penka Girginova
Cajal Programme Coordinator Mariana Costa
Teaching Lab Coordinator Hugo Marques

Highlights

(1) PhD Programmes in Neuroscience and Cancer, offering advanced, interdisciplinary training in their respective fields; (2) CAJAL Advanced Neuroscience Courses, providing immersive, hands-on learning with leading experts; (3) Advanced Course in the Fundamentals of Medicine, giving researchers essential medical knowledge to support translational research; (4) Clinical Seminars for Physicians and Researchers, fostering dialogue and collaboration between lab and clinic.

These initiatives reflect the GSO's commitment to strengthening the institution's academic and scientific community through dynamic, high-quality training. By expanding its activities, the GSO continued to promote an integrated approach bridging cutting-edge research, clinical practice, and health innovation.

Health and Science

As clinical and research initiatives at CF continue to evolve, so too does the importance of clear and accessible communication. The growing impact of the Experimental Clinical Research programme has highlighted the need to make complex medical and health-related information both understandable and relevant to a wider audience.

Coordinator Teresa Fernandes
Health and Science Writer Ana Gerschenfeld

Highlights

In 2024, the Health & Science Communication team remained committed to this mission, crafting content that connects cutting-edge research with the public, patients, and healthcare professionals alike. From press releases and interviews to online health-education series, our efforts aim to ensure that CF's innovations are not only shared with our academic and clinical colleagues, but also with society at large.

This ongoing work supports a broader vision: to foster dialogue around health and science, promote awareness of medical advancements, and ultimately, contribute to a more informed and engaged society.

Lab Administration

The Laboratory Administration Unit supports CR scientists by handling a wide range of day-to-day tasks, allowing researchers to focus on their work. The team works closely with principal investigators, lab managers, and other lab members, assisting with ordering, budgeting, travel arrangements, data collection, and ensuring compliance with financial reporting standards. Lab Administrators also collaborate regularly with other CR support units, platforms, and departments – such as Post-Award, Logistics, and Accounting – as well as with external suppliers, service providers, shipping companies, and brokers. The team's core mission is to serve the CR community and improve overall organisational efficiency.

Coordinator Raquel Gonçalves
Lab Administrators António Raposo, Catarina Cosme Ferreira, Margarida Nunes, Mariana Sampaio, Tânia Matos, Vesna Petojevic

As CR continues to grow, the Laboratory Administration team has remained committed to supporting the evolving needs of both long-standing and new researchers. The departure of two experienced team members added to the workload and posed challenges during the recruitment process. However, through resilience and collaboration, the team maintained the delivery of essential support and ensured the smooth operation of laboratory activities.

Office for Sponsored Programmes – Post-Award

The Office for Sponsored Programmes (OSP) – Post-Award plays a vital role in the effective management of research grants. It provides comprehensive support with financial and scientific reporting, cost eligibility, and overall grant administration, ensuring compliance with funders' requirements. Beyond administrative oversight, the OSP serves as a key bridge between the CR scientific community and the complexities of grant management. By streamlining processes and offering expert guidance, it helps researchers navigate bureaucratic challenges, optimise resource allocation, and stay focused on their scientific work.

Coordinator José Mário Leite
Project Manager Francisco Semedo
Project Officers Helena Duarte, Henrique Moreira, Inês Bonifácio, Pedro Monteiro, Rizwana Mahomed, Sandra Jacinto, Sofia Venâncio, Vanda Vicente

Highlights

The OSP was central to the management of approximately €57 million across 139 projects, ensuring efficient oversight and full compliance with funding requirements. It submitted nearly 160 financial reports and 65 scientific reports to various funding agencies, supporting the research community in meeting reporting obligations and maintaining transparency in grant administration.

Operations

The Operations Unit ensures the smooth day-to-day functioning of the labs by providing timely, effective support and managing infrastructure, maintenance, equipment, and space-related matters. We develop and implement operational policies and procedures, and also assist Principal Investigators with resource planning, equipment acquisition and installation, offering general guidance as needed.

The team also oversees health and safety across the laboratories, maintaining high standards and providing initial inductions and training. The CR SafeLab website serves as a central hub for health and safety resources, including a chemical safety database, safety protocols, waste management guidelines, and information on common laboratory hazards.

Coordinator Cátia Feliciano
Officer Daniela Novo

Highlights

In 2024, the Operations team continued to deliver comprehensive support across CR. This included coordinating and managing laboratory spaces and infrastructure, overseeing equipment acquisition and maintenance, ensuring health and safety compliance, and implementing operational procedures to maintain smooth daily functioning. The team worked closely with researchers and other support units to respond to evolving needs and uphold high standards across all facilities.

Strategic Research Development

The Strategic Research Development team leads fundraising initiatives to support research, innovation, and technology development at CF. We identify opportunities in policy, funding, and collaboration, while co-designing, co-developing, and co-launching strategic programmes and projects.

Since 2017, we have partnered closely with the CF community to refine our approach and foster a strong team culture that enhances the success of research funding efforts. Thanks to the dedication and excellence of CF researchers, these efforts have secured more than €80 million in external research funding – over two-thirds of which has come from international sponsors.

We are committed to expanding these opportunities, strengthening global partnerships, and ensuring that groundbreaking research at CF continues to thrive.

Coordinator Joana Lamego
Grant Managers Ana Luísa Tomás, Andreia Tavares, Bruno Ceña, Cátia Figueiredo, Filipa Lourenço Cardoso, Mafalda Farelo

Highlights

We shared 196 funding opportunities and supported 127 grant applications to 35 sponsors. Over two-thirds of the €6 million secured by CF researchers came from international funders, reinforcing the Foundation's global presence. The team welcomed three new members – Cátia Figueiredo, Ana Luísa Tomás, and Mafalda Farelo – while Filipa Lourenço Cardoso began a new chapter at Hovione.

Together with INESC-ID and Unbabel, we secured and implemented the Science4Policy Bridge AI project, funded by Portugal's Recovery and Resilience Plan, FCT, and PlanAPP, and involving national and international experts, including from CF.

Our international presence expanded: we co-led a workshop with the University of Melbourne at the 2024 Australasian Research Management Society conference in Australia, where our poster – presented by Bruno Ceña and Joana Lamego – was recognised as one of the best. Ceña and Andreia Tavares represented CF at the 2024 European Association of Research Managers and Administrators (EARMA) Conference in Denmark. Ceña also received an EARMA Event Access Award and was selected to the US NCURA Global Community – a prestigious research administration network.

Group photo at the annual retreat
at Grande Hotel do Luso.

↓

In 2024, CR's publications encompassed new discoveries in both fundamental research topics and translational and clinical fields. Many of these publications resulted from collaborative efforts among various groups within CF. The featured publications provide an overview of CR's extensive research spectrum.

Publications

72	Research articles
22	Reviews and Perspectives
10	Conference Proceedings
20	Preprints
5	Protocols and Guidelines
4	Editorials, Comments and Replies
1	Case Report
2	Books / Book Chapters

10

“Zombie Neurons” Shed Light on How the Brain Learns

Silva et al.
Nature Neuroscience

With a little help from some surprising “zombie neurons”, the Neural Circuits and Behaviour | Carey lab revealed critical insights into how the brain learns through experience. Focusing on the cerebellum, a brain region involved in movement and learning, researchers investigated how we link sensory cues to specific actions. They showed that a class of nerve fibres called climbing fibres acts as a powerful “teaching signal”. When these fibres were artificially activated in mice during a visual cue, the animals learned to blink in response – even though the usual sensory trigger, a puff of air to the eye, was missing.

But then came a surprising twist: the researchers discovered that genetically altering these fibres to control their activity made them behave like “zombies”: they were still active but no longer responded appropriately to real-world stimuli. Mice with these altered neurons couldn’t learn the blinking task using normal cues, proving that the natural activity of climbing fibres is essential for this kind of learning. The study not only strengthens our understanding of how the brain turns mistakes into lessons but also introduces a new and more natural way to probe brain circuits – by subtly modulating their activity without shutting them down – potentially opening doors for exploring how learning goes wrong in neurological conditions.

Zebrafish Avatars Help Predict the Best Cancer Treatment

Costa et al.
Nature Communications

The Cancer Development and Innate Immune Evasion | Fior lab showed that a test based on tiny zebrafish “avatars” can accurately predict how individual colorectal cancer patients will respond to chemotherapy. The method involves injecting tumour cells from a patient into zebrafish embryos, effectively creating a personalised miniature model of the patient’s cancer. Within just 10 days, doctors can test different treatment options on the avatars and identify which one is likely to work best – with an impressive 91% accuracy.

The study, which included 55 patients from the Champalimaud Clinical Centre and Fernando Fonseca Hospital, marks a significant step towards truly personalised cancer treatment. By matching therapy to tumour behaviour in a living model, the test could help patients avoid ineffective treatments and the harmful side effects that often come with them. The team is now preparing a clinical trial to compare this new test with the current standard approach. If successful, the zAvatar-test could become a powerful new tool to guide cancer care more precisely and improve patient outcomes.

A Flicker of Truth: Piercing the “Continuity Illusion”

Gil et al.
Nature Communications

When we watch a movie, our brain stitches together a series of still images into what feels like continuous motion – a phenomenon known as the “continuity illusion”. But how exactly does the brain make this leap? The Preclinical MRI | Shemesh lab uncovered an unexpected player: the superior colliculus (SC), a deep brain structure often overshadowed by the cortex. By combining functional MRI, behavioural experiments, and electrical recordings, the team showed that the SC plays a key role in helping animals transition from seeing separate flashes of light to perceiving smooth, continuous motion.

Using rats as a model, the researchers trained animals to distinguish between flickering and continuous light, then measured brain activity as the light frequency increased. They found that when the light was perceived as continuous, activity in the SC dropped – a kind of neural “quieting” that seems essential for the illusion to occur. Surprisingly, this effect remained even when the cortex was disabled, suggesting the SC is not just involved but may actually drive this core visual process. These findings shed new light on how we perceive motion, and could one day inform clinical tools to assess and treat visual processing issues in conditions like stroke, autism, or visual impairments.

Key Brain Circuit for Female Sexual Rejection Uncovered

Gutierrez-Castellanos et al.
Neuron

The Neuroethology | Lima lab discovered a key brain circuit that controls sexual rejection in female mice. While it’s long been known that female mammals accept mating only during fertile phases, this study shows that rejection isn’t just the absence of interest – it’s an active, brain-driven behaviour. The team identified a group of hormone-sensitive neurons in a brain region called the anterior ventromedial hypothalamus that become highly active when a female is not fertile, prompting defensive behaviours like kicking or avoiding the male.

Using advanced techniques to track and manipulate brain activity, the researchers showed that these neurons act like a biological switch. When activated, even during the fertile phase, they caused females to reject males. When silenced, rejection behaviours were reduced, though not entirely replaced by receptivity – suggesting that separate brain circuits are responsible for saying “yes” and “no”. This discovery reveals a more flexible and dynamic system for regulating mating behaviour and offers new insight into how internal states and hormones shape social interactions – with possible relevance for understanding human conditions linked to social and reproductive behaviour.

Pink Elephants in the Brain? How Experience Shapes Neural Connectivity

Dias et al.
Neuron

Our brains don't just passively register what we see – they interpret it based on experience. The Cortical Circuits | Petreanu lab, supported by the la Caixa Foundation, explored how the brain learns to connect visual details with higher-level concepts. By comparing mice raised in the dark to those raised in normal light, the team discovered that visual experience shapes the wiring between brain areas, allowing animals to better interpret scenes by drawing on context and past knowledge. Without experience, connections between brain regions were neatly aligned, but with experience, these connections became more complex and diverse – helping the brain integrate information from a broader visual field.

The study suggests that the brain stores learned concepts by linking neurons that don't usually fire together – a strategy that may make it easier to detect unexpected or unfamiliar things, like a pink elephant in the wild. This process of combining sensory input with prior knowledge is crucial for understanding the world around us, and may be disrupted in mental health conditions such as autism and schizophrenia. The findings offer insight into how our brains become better at making sense of what we see – and may help explain what goes wrong when that process is disrupted in conditions like autism and schizophrenia.

Parkinson's Paradox: When More Dopamine Means More Tremor

Mendonça et al.
Parkinson's Disease

In Parkinson's disease, tremor is one of the most recognisable symptoms – but also one of the least understood. The Neural Circuits Dysfunction | da Silva lab, in collaboration with the Neuropsychiatry | Oliveira-Maia and Radiopharmacology | Costa Labs, uncovered a surprising link between tremor and dopamine, the chemical messenger that helps control movement. While Parkinson's is usually linked to a loss of dopamine in the brain, the researchers found that patients who experienced more severe tremor actually had more dopamine remaining in a particular brain area called the caudate nucleus.

The team combined brain scans, clinical data, and wearable sensors to measure tremor with high precision in over 500 patients. Their results suggest that tremor is linked to specific brain circuits that are affected differently in each person. Rather than treating Parkinson's symptoms as a single group, the researchers argue that isolating and studying symptoms like tremor on their own could lead to better understanding – and eventually, more tailored treatments. The study opens new directions for addressing one of the most troubling symptoms of the disease.

Brain Patrol: Local T Cells Protect Against Silent Parasite

Porte et al.
PNAS

Toxoplasma gondii is a common parasite carried by more than a billion people around the world. It often stays hidden in the brain for life without causing any problems – unless the immune system becomes weakened, in which case it can lead to serious brain infections. In the study co-authored by Klaas van Gisbergen, Principal Investigator of the Tissue Immunity lab, researchers uncovered how a special group of immune cells that live permanently in the brain – called brain-resident CD8+ T cells – play a key role in keeping the parasite under control. These cells don't rely on support from the rest of the immune system; instead, they get their instructions from the brain's own nerve cells and immune cells.

Using a mouse model of long-term infection, the team found that these brain cells show the parasite to the immune system in a way that helps CD8+ T cells become highly effective defenders. Some of these defenders act quickly to fight off threats, while others seem to behave like stem cells – able to renew themselves and offer lasting protection. Importantly, the researchers also found that, unlike in some chronic infections, these brain-resident immune cells stay active and don't become "exhausted". By identifying how these cells form and stay functional, the study points to new ways of boosting brain immunity – especially in people with weakened immune systems, such as those living with HIV.

How the Body's Fat-storing System Keeps Time

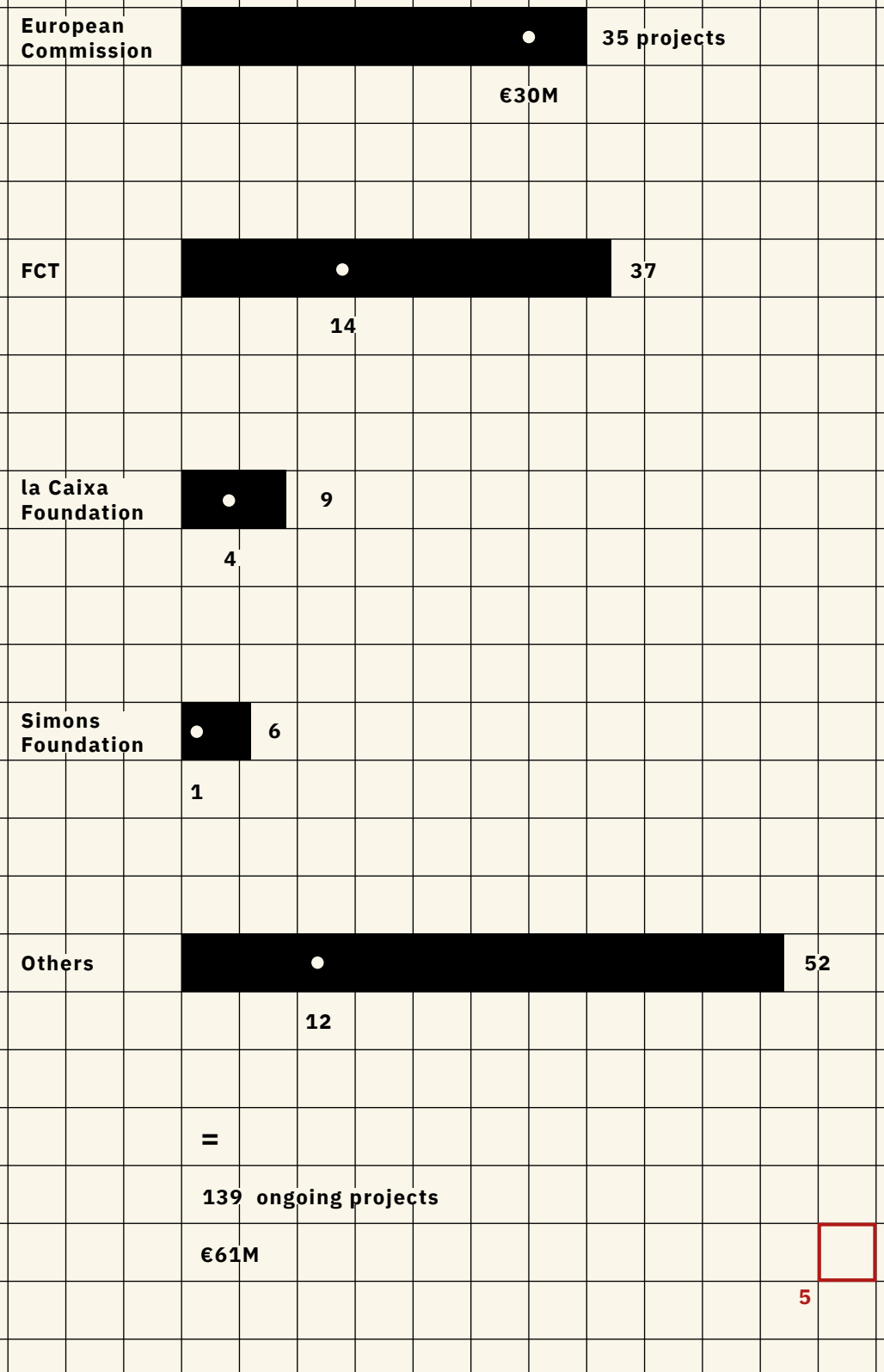
Douglas et al.
Nature

We often think of the immune system as our defence against infections – but this study, conducted by the Immunophysiology | Veiga-Fernandes lab in collaboration with international partners, showed it also plays a key role in regulating how our bodies store fat. The research reveals that a type of immune cell in fat tissue, called gamma-delta T cells, helps trigger the process of turning excess carbohydrates into fat. Crucially, these cells don't just work anytime – they follow a built-in molecular "clock", producing a signalling molecule called IL-17 only at certain times of day. This timing ensures that fat storage happens when carbohydrates from food are most available, helping the body manage energy efficiently.

The team also found that when this internal clock is disrupted – as can happen with irregular sleep, shift work, or jetlag – it can throw metabolism out of sync and increase the risk of diseases like diabetes, obesity, and cardiovascular problems. These findings highlight how closely our immune system is tied to our lifestyle and environment, and suggest new directions for therapies that could target these biological rhythms to help manage metabolic disorders.

Competitive External Funding

Since the establishment of the research programme, CR scientists have received significant support for their work through competitive external funding schemes. Counting all newly awarded and previously secured projects, a total sum of €61M was active at CR during 2024. These funds were awarded by a diverse group of national and international organisations. Among these, the major contributors were the European Commission and the Foundation for Science and Technology (FCT).



Highlights

CF maintained a strong presence in the international funding landscape. More than 85% of the funds secured – amounting to approximately €6 million – came from international sponsors, a testament to the global relevance and excellence of the research conducted at the Foundation. In total, 17 research teams across the Foundation's three scientific programmes – Physiology and Cancer (34%), Neuroscience (14%), and Experimental Clinical Research (44%) – secured competitive funding, with an additional 7% going toward institution-wide initiatives led by Christian Machens and João Lagarto.

European Commission and ERC Grants

At the European level, the Foundation benefited strongly from the support of the European Commission, which accounted for 42% of the year's total funding. Among the most prestigious awards were two European Research Council (ERC) grants. A Starting Grant was awarded to Andrada Ianus, marking the beginning of her independent research career at King's College London. Meanwhile, Albino Oliveira-Maia received a Proof of Concept Grant to explore the innovation potential of his work. CF also joined a network of world-renowned institutions – via the Fior lab – to support scientific capacity building at the University of Belgrade, as part of an EU initiative to bolster research excellence in Serbia.

Diversification of European Funders

Beyond the ERC, a diverse array of European funders also recognised CF's scientific strengths. The la Caixa Foundation awarded a Health Research Project Grant to Ana Luísa Correia to study the spatiotemporal dynamics of organ-specific microenvironments in breast cancer metastasis, in collaboration with Tel Aviv University. Fight Kids Cancer provided funding to CF for the first time, supporting a consortium led by the Sanchez-Danèslabto establish the first preclinical genetic mouse models of Group 4 medulloblastoma. In another first for the Foundation, the European Hematology Association awarded a Kick-off Grant to the Minutti lab to investigate the nutrition-immunity axis mediating conventional dendritic cell development in bone marrow.

International Funders Beyond Europe

The Foundation attracted 13% of its funding from three high-profile, non-European international sponsors. The Chan Zuckerberg Initiative awarded Carlos Ribeiro for a project mapping fatty acid synthesis across an entire organism, both spatially and temporally. Juan Sanchez (Rhiner Lab) was awarded a Human Frontier Science Program (HFSP) Postdoctoral Fellowship. Meanwhile, the Simons Foundation honoured CF with its Neuroscience Collaborations Conferences and Courses Award in recognition of the Cajal Advanced Neuroscience Training Courses hosted at CF, an initiative led by Christian Machens.

National Funding and Strategic Support

Nationally, FCT supported several CF research teams through its Exploratory Research Projects call. FCT also awarded an ERC-PT grant to Christa Rhiner, whose project received the highest possible qualitative score in the European ERC Consolidator Grant call but could not be funded due to budget constraints at the ERC. In addition, FCT supported the national partners involved in a European consortium project led by Andrada Ianus, which seeks to enhance integrative decision-making in rectal cancer care. Selected by the European Partnership on Transforming Health and Care Systems, the project's coordination has since been transferred to the University of Algarve.

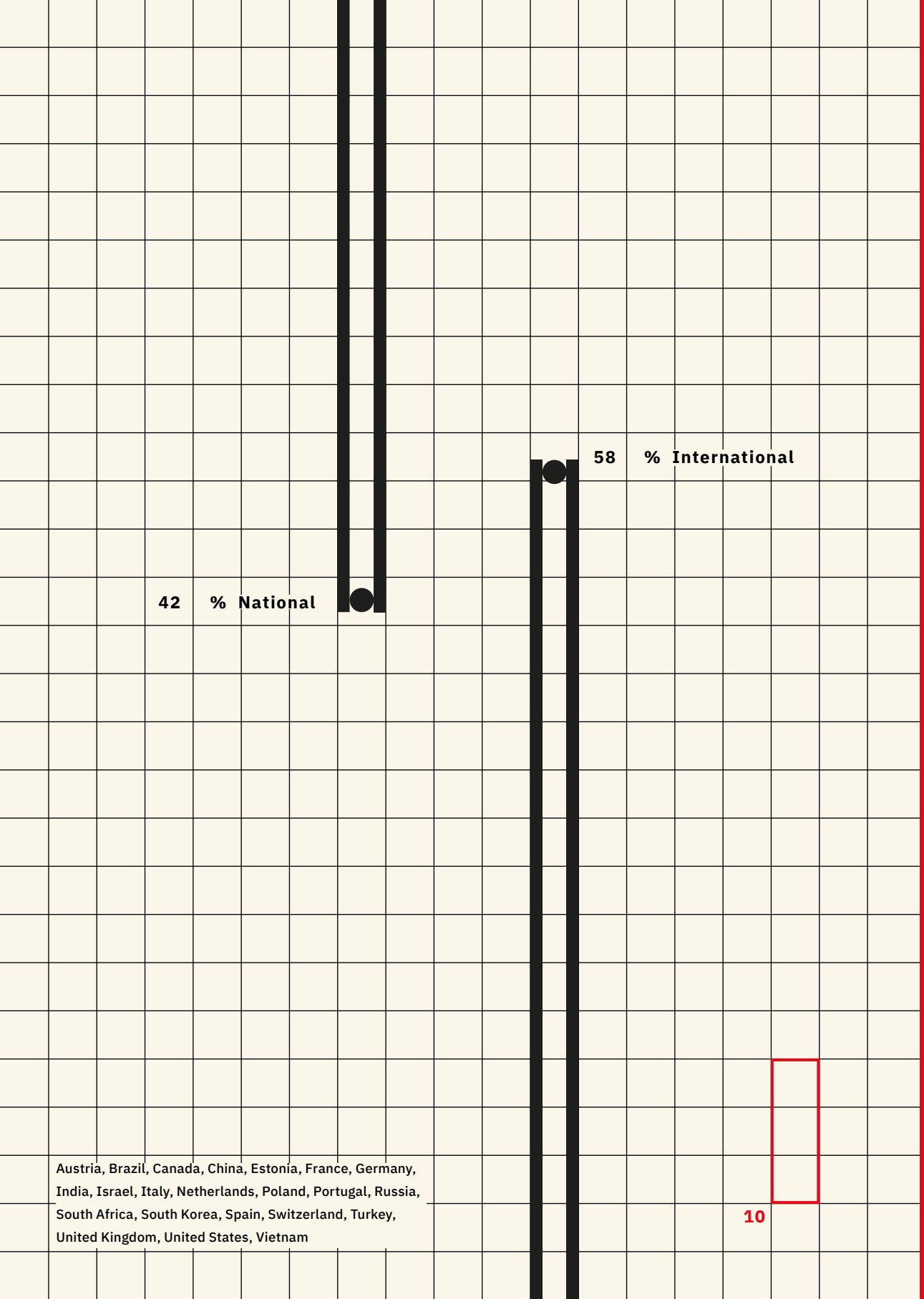
Further national recognition came through specialised organisations. The Liga Portuguesa Contra o Cancro awarded one of its oncology research grants to the Sanchez-Danès lab. Ruxanda Lungu (Shemesh lab) was honoured with a Campus Neurológico Sénior Award, while the João lab was selected for a Multiple Myeloma Research Grant by the Associação Portuguesa Contra a Leucemia.

Early-Stage Researchers Lead the Way

CF's early-stage researchers continued to shine on the international stage. Aside from Juan Sanchez's HFSP Postdoctoral Fellowship, Caroline Haimerl (Machens and Paton labs) received the Simons Collaboration on the Global Brain Transition to Independence Award. Bruna Garcia Martins (Correia lab) was named a Schmidt Science Fellow – the first such award for CF – while Alice Geminiani (Carey lab) secured a Marie Skłodowska-Curie Actions Postdoctoral Fellowship from the European Commission.

Education

Since its inception, CR has regarded educating scientists as one of its key strategic objectives. To this end, CR has devoted considerable efforts to the development and implementation of outstanding educational programmes, advanced courses, and workshops. Among these, three main endeavours are the International Neuroscience and Cancer Doctoral Programmes, the Fundamentals of Medicine Course, and the CAJAL Advanced Training Courses.



International Neuroscience Doctoral Programme

International Neuroscience Doctoral Programme (INDP) offers comprehensive and integrative training in behavioural neuroscience. The programme fosters active participation, autonomy, and critical thinking, preparing students to become innovative scientists and researchers. Students come from across the globe with backgrounds in life sciences, physics, psychology, mathematics, and computational sciences.

The final stage of recruitment for the 2024 cohort took place on 14-15 March in a hybrid format, involving 30 candidates selected through curriculum review. From 9-14 September 2024, the Graduate Studies Office (GSO) hosted the fourth edition of the INDP Orientation Week, marking the start of the programme's curricular component.

Director Megan Carey, CF
Co-Director Memming Park, CF
Scientific Advisory Board Jonathan Pillow, Princeton Neuroscience Institute; Laura Andreae, King's College London; Mónica Bettencourt Dias, Gulbenkian Institute of Molecular Medicine
INDP 2024 Cohort Anna Beltramini, US; Athira Dilip, IN; Diana Bernardo, PT; Francesco Costantino Costabile, IT; Hannah Vormann, DE; Joan Gort, ES; Joseph Tutt, UK; Madhuri Srinivasan, IN; Pedro Dias, PT; Shahar Haim, IL; Shrivas Chaterji, IN; Simon Zamora, CH

Highlights

Throughout 2024, students participated in courses on core topics in contemporary biology and neuroscience, with a strong hands-on component and emphasis on quantitative skills. In the first year, students completed lab rotations, giving them the chance to explore different research lines and select a lab for their thesis.

Each student is supported by a thesis committee that monitors their progress and offers continuous guidance. The programme is fully accredited, and degrees are awarded by the Foundation's academic partners: ITQB NOVA – Instituto de Tecnologia Química e Biológica António Xavier, part of NOVA University Lisbon, and ISPA – University Institute of Psychological, Social and Life Sciences.

PhD students benefit from a dynamic academic environment, with weekly seminars led by internal and external experts, spanning both basic and clinical research topics. They also have access to a wide array of meetings and workshops.

Total number of PhD Students 66
Theses defended in 2024 13

International Cancer Doctoral Programme

With the Foundation's growing emphasis on cancer research, the International Cancer Doctoral Programme (ICDP) was officially launched in early 2024. The programme aims to become a global reference in cancer training, spanning basic research, clinical studies, and medical experimentation.

It aspires to train the next generation of scientists, doctors, and physician-scientists through interdisciplinary projects that bridge fundamental research and clinical practice.

Director Pedro Castelo Branco, Medical School of the University of Algarve (FMCB)
Programme Committee Catarina Brito, ITQB NOVA; Isabel Palmeirim, CF; Pedro Castelo Branco, FMCB
Education Committee Ana Luísa Correia, CF; Rita Fior, CF
ICDP 2024 Cohort Daniela Cuffs, PT; Hongren Huang, CHN; Lynn Vermeer, NL; Maria Pires, PT; Miguel Patrício, PT; Tianci Zhong, CHN

Highlights

The first cohort began in January 2024, while the second was selected in March 2024, with six students starting their PhDs in September. They joined the 12 new INDP students during Orientation Week.

Since then, ICDP students have explored the cellular and molecular mechanisms of cancer – including uncontrolled cell division, genetic and non-genetic drivers, tumour heterogeneity, invasion, metastasis, and tumour-host interactions. To refine their focus, students completed three lab rotations before choosing a thesis project.

The programme is fully accredited. Degrees are awarded by FMCB and ITQB NOVA.

Total number of PhD Students 15

Champalimaud Student Retreat

The 2024 Student Retreat brought together over 130 participants – PhD and Master's students, technicians, and invited speakers – for three days of learning, connection, and career reflection. Held from 29–31 October in the scenic town of Ferreira do Zêzere, the event took place at the Casa do Adro hotel and Alfredo Keil Cultural Centre.

Away from the usual lab setting, the retreat offered a relaxed environment where participants could step back, exchange ideas, and get to know colleagues from other labs and programmes.

Highlights

Themed "Navigating the LABrynth & Beyond", the retreat focused on life during and after a PhD, helping participants explore different career paths in science and beyond. Through a mix of talks and workshops, students were encouraged to think more broadly about their futures – whether in academia, industry, science communication, or other fields.

Guest speakers shared diverse experiences: career coach Pedro Resende (Co-founder & Director of Chaperone) highlighted the importance of actively managing one's professional journey during a PhD; Carlos Minutti (PI, CR) offered an honest take on the academic path; and André Pacheco (Centre for Marine and Environmental Research, University of Algarve) explored how communities can lead sustainability initiatives.

Other sessions featured Benilde Pondeca (Ophiomics) on moving from academia into industry, Diandra Brkic (Nestlé) on neuroscience research in the private sector, and Nicolas Chornet (Moderna), who gave an insider's view of careers in pharma and biotech.

Fundamentals of Medicine

In 2020, CF initiated an educational programme aimed at bridging the gap between fundamental research and clinical practice.

Within the framework of the innovative medical programme at the University of Algarve, which uses a problem-based learning method, the Fundamentals of Medicine Course provides a select group of scientists from the Foundation with a solid grounding in the principles of human physiology, pathology, and medicine.

This course aligns with CF's mission to advance translational research and improve patients' lives. The extraordinary enthusiasm, interest, and commitment from students and teachers across all editions underscore the programme's success.

Highlights

Postgraduate Programme in Fundamentals of Medicine

Four students who completed the Postgraduate Programme in Fundamentals of Medicine (PG-FoM) and pursued medical studies finished their 5th year of the Integrated Master's in Medicine course at the University of Algarve's Faculty of Medicine and Biomedical Sciences in July 2024. They began their 6th and final year in September, and may be joined by the top student from the second edition of the PG-FoM, who is awaiting the outcome of the admissions process.

Advanced Course in Fundamentals of Medicine

The 1st edition of the Advanced Course in Fundamentals of Medicine (CA-FoM), launched in September 2023, concluded in June 2024. Of the ten participants, seven completed it with final scores ranging from 11 to 17 out of 20. One student left early to start medical school at the University of Lisbon.

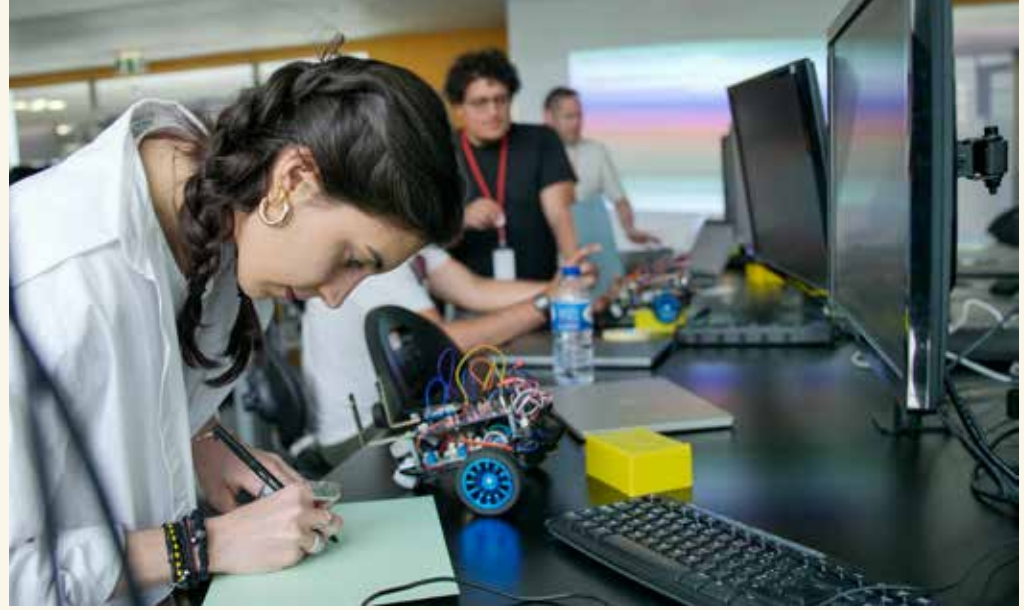
The 2nd edition of CA-FoM began in September 2024, maintaining the same structure. It attracted 26 applicants, selecting seven internal and three external candidates from the Faculty of Sciences and the Faculty of Pharmacy of the University of Lisbon and Instituto Superior Técnico. The course continues to stand out for its strong student and faculty engagement.

CAJAL Advanced Neuroscience Training Programme

In 2024, the CAJAL Advanced Neuroscience Training Programme continued its activities at CF, offering intensive three-week courses led by internationally renowned neuroscientists in a dynamic and interactive environment. The programme aims to provide students with hands-on learning experiences through small scientific projects.

This initiative is the result of a partnership between five institutions – the Federation of European Neuroscience Societies (FENS), International Brain Research Organization (IBRO), The Gatsby Charitable Foundation, University of Bordeaux, and CF – committed to establishing a centre of excellence for advanced neuroscience training in Europe.

In 2024, two courses were held, bringing together 34 faculty members, eight teaching assistants, and 44 students.



CAJAL course on Quantitative Approaches to Behaviour and Virtual Reality
2 – 22 June

Quantitative studies of behaviour are fundamental to our understanding of brain function and dysfunction. In recent years, techniques for studying behaviour–as well as those for monitoring and manipulating neural activity–have advanced rapidly. This course therefore aims to provide promising young scientists with a comprehensive introduction to state-of-the-art methods in quantitative behavioural research.

The content of this course complements other summer programmes that focus on measuring and manipulating neurophysiological processes. Its main emphasis is on methodologies for acquiring rich behavioural data, analysing it statistically, modelling its dynamics, and integrating behavioural measurements with other types of neurobiological data. To this end, students: (1) build devices for recording the behaviour of experimental organisms–including flies, fish, and humans; (2) learn, under the guidance of the scientists who developed these methods, how to use modern tools to analyse behavioural data from these organisms; and (3) design and carry out a behavioural study of their own in a week-long independent project, with support and supervision from the course instructors and teaching assistants.

Course Directors Ann Kennedy, Northwestern University; Benjamin de Bivort, Harvard University; Giorgio Gilestro, Imperial College London; Daniel McNamee, CF
Scientific and Technical Manager Hugo Marques, CF
Venue Manager Mariana Campos Costa, CF

CAJAL course on Computational Neuroscience
15 July – 2 August

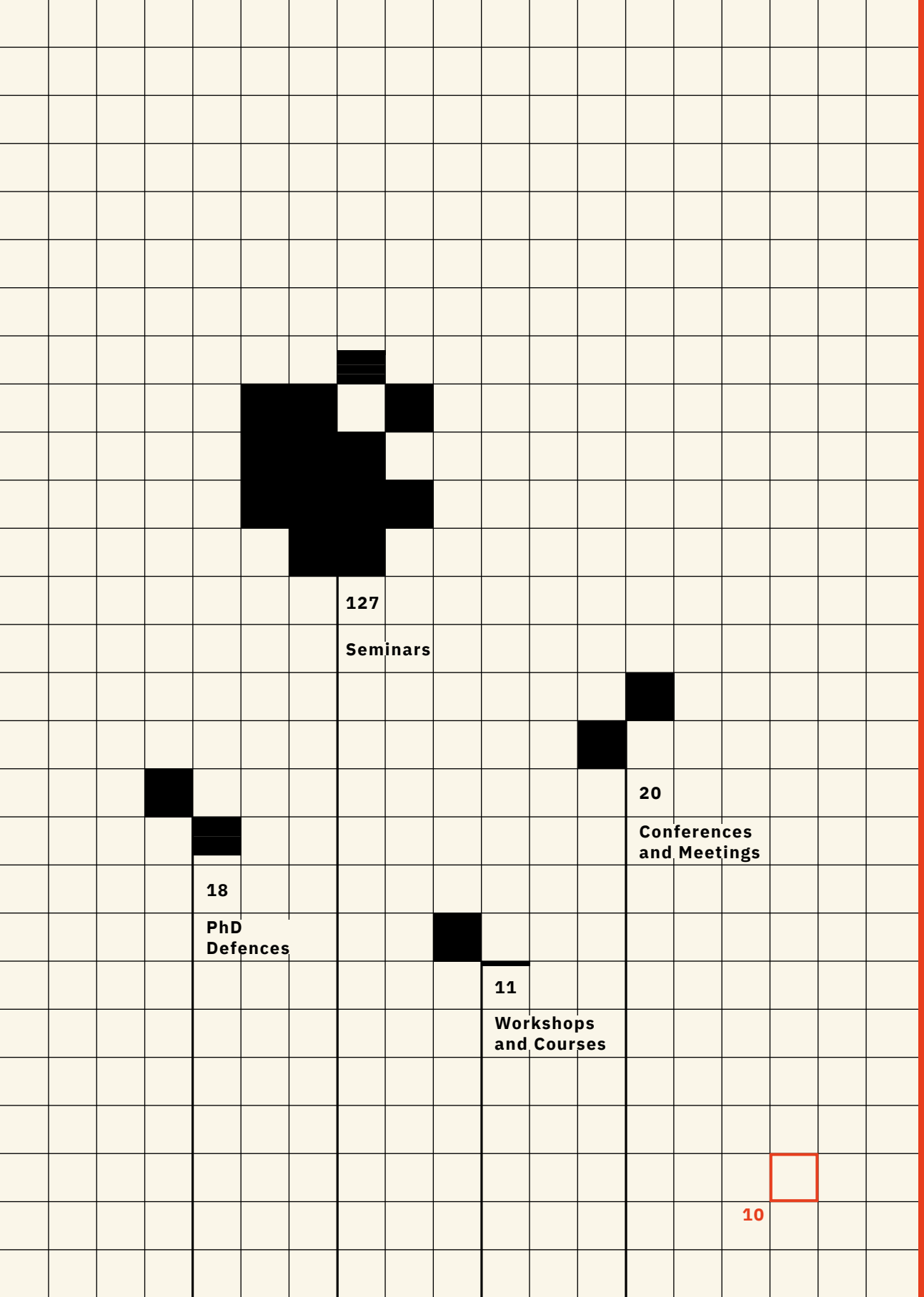
Computational neuroscience is a rapidly evolving field whose methods and techniques are essential not only for understanding and modelling the brain, but also for designing and interpreting experiments. Mathematical modelling serves as a powerful tool to navigate the vast complexity of neurobiological systems and their many interacting components.

This course introduces the core concepts, methods, and practices of modern computational neuroscience through a combination of lectures and hands-on project work. Each morning, distinguished international faculty deliver lectures covering a wide range of topics across experimental and computational neuroscience. During the rest of the day, students work in teams of two to three on research projects under the close supervision of expert tutors and faculty. These projects–proposed by the faculty in advance–include modelling neurons, neural systems, and behaviour; analysing cutting-edge neural datasets (such as behavioural data, multi-electrode recordings, calcium imaging, and connectomics); and developing theoretical frameworks to explain experimental findings.

Course Directors Alfonso Renart, CF; Brent Doiron, University of Chicago; Julijana Gjorgjieva, Technical University of Munich; Maria Geffen, University of Pennsylvania
Venue Manager Mariana Campos Costa, CF

Scientific Events

In 2024, CR successfully hosted over 170 scientific events in a variety of formats, including on-site, online, and hybrid settings. The number of seminars and conferences continued to grow, reinforcing CR's commitment to connecting its research with the wider scientific community. A notable highlight of the year was the return of the *CR Colloquia Series*, which featured 27 speakers, encouraging dialogue and collaboration on key issues in basic and clinical research. Additional highlights included the *inaugural Portuguese Conference on Brain Stimulation in Mental Health*, the debut of *Medica AI – The Conference*, and the co-organisation of the *17th Annual Meeting of the Zebrafish Disease Models Society*.



CR Symposium

16 – 18 October
Champalimaud Research Symposium (#CRSy24)
The Ecology of Cancer: Understanding and Targeting Cancer-host Interactions

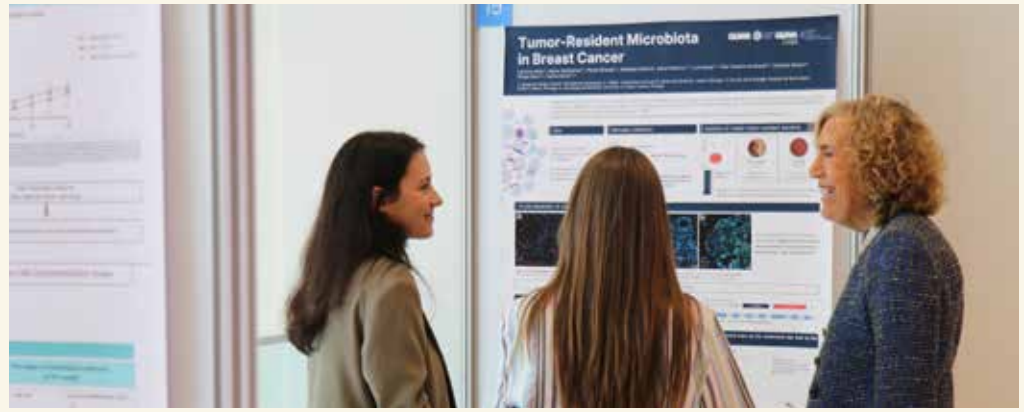
2024's edition aimed to bring together a diverse range of researchers to explore fundamental aspects of cancer initiation and progression within the organism's broader context. During three eventful days, the symposium provided a forum for a broader community of basic researchers, clinicians, technology entrepreneurs and patient advocates to discuss emerging themes in the field of cancer biology that are expected to shape future directions of cancer therapies. The symposium featured presentations by 19 distinguished speakers, selected talks from abstract submissions, and two poster sessions, alongside social and networking opportunities, adopting a hybrid format to accommodate both in-person and online attendance.

Keynotes Brian Brown, Mount Sinai School of Medicine, US
Cyrus Ghajar, Fred Hutchinson Cancer Center, US
Elaine Fuchs, HHMI, The Rockefeller University, US
Laurence Zitvogel, Gustave Roussy, FR

CRSy24 Chairs Ana Luísa Correia, Cancer Dormancy and Immunity lab
Carlos Minutti, Immunoregulation lab
Klaas van Gisbergen, Tissue Immunity lab

Invited Speakers Ana Gomes, Moffitt Cancer Center & Research Institute, US
Andreas Moor, ETH Zürich, CH
Amanda W. Lund, NYU Langone, US
Chrysothemis Brown, Memorial Sloan Kettering Cancer Center, US
Evangelos Giampazolias, Cancer Research UK, Manchester Institute, UK
Henrique Veiga-Fernandes, CF, PT
Jacco van Rheenen, The Netherlands Cancer Institute, NL
Julie Helft, Institut Cochin, FR
Leanne Li, The Francis Crick Institute, UK
Matteo Iannacone, San Raffaele Scientific Institute & University, IT
Peter Bailey, CF, PT
Philippe Bousso, Institut Pasteur, FR
Pierre Guermonprez, Institut Pasteur & CNRS, FR
Vera Martins, Instituto Gulbenkian de Ciência, PT
Wolfgang Kastenmüller, University of Würzburg, DE

Editors Claire Olingy, Science Immunology, US
Julieta Alfonso, Springer Nature, DE
Paula Jauregui, Nature Immunology and Nature Microbiology, ES



Onsite speakers 19
Selected speakers 8
Posters 50
Editors 3
Participants 290

Countries Belgium, China, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Switzerland, United Kingdom, United States

Champalimaud Internal Seminar Series

CISS is a weekly event designed to foster collaboration among researchers at CR and to provide opportunities to practise public speaking and peer communication skills. Open to the entire CF community, these seminars take place in the Seminar Room and feature presentations from two different labs, each lasting 25 minutes, followed by a five-minute Q&A. All labs are included in the rotation to ensure broad representation across the programme. This format enables CR researchers to share ongoing work, receive immediate feedback, and help cultivate a vibrant community where members become familiar with each other's research while honing their presentation skills.

Champalimaud Open Seminar

The COpS series is designed to strengthen connections within the community while promoting the research conducted at CR to the public. Held in the Main Auditorium, each seminar features two Group Leaders who each give a 30-minute presentation followed by a 15-minute Q&A session. This format encourages the sharing of innovative and ongoing research at CR, engaging not only the internal community but also local research institutes.

Innovation Speaker Series

The Innovation Speaker Series is designed to acquaint students, postdocs, and faculty with strategies for bringing their research to the marketplace. Through a series of fireside chats, innovation experts, industry professionals, successful entrepreneurs, and technology transfer veterans join the CR community to share their insights, experiences, and actionable advice for translating research into realworld solutions.

CR Colloquia Series

The CR Colloquia Series is a weekly seminar that encourages dialogue and collaboration around key questions in neuroscience, physiology, and cancer research. Each session features an invited speaker – ranging from established experts to emerging talents – aimed at facilitating knowledge exchange and sparking synergies among CR researchers and the broader scientific community. Speaker selection is guided by community and faculty nominations and curated by the CR Colloquia Committee to ensure a high-quality, diverse and well-balanced programme. Participants are encouraged to engage with speakers through weekly networking activities, enhancing connections and inspiring meaningful exchanges of ideas.

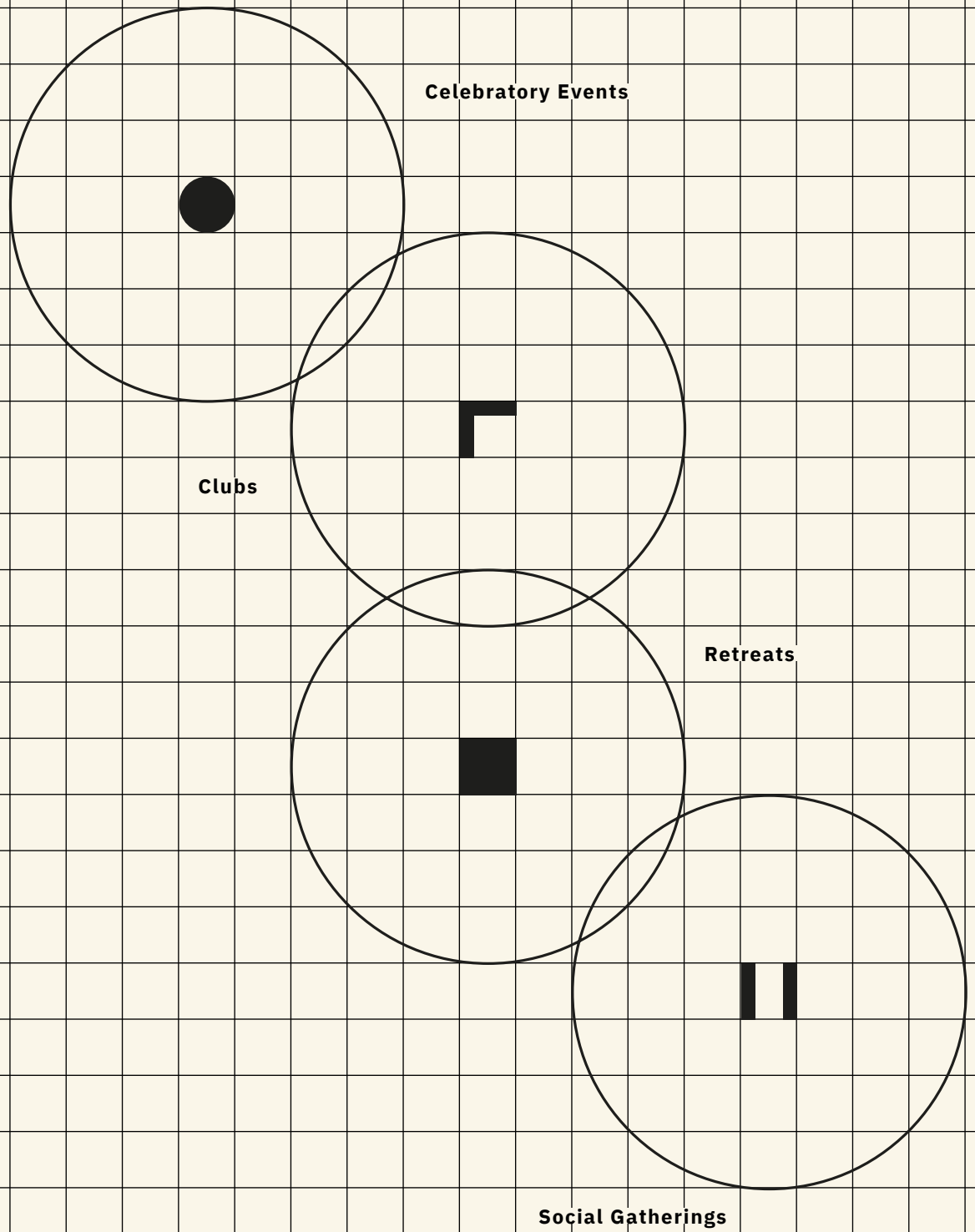
2024 CR Colloquia Committee Ana Rita Mendes, Neuroethology lab; Carlos Minutti, Immunoregulation lab; Cristina João, Myeloma Lymphoma Research lab; Daniel McNamee, Natural Intelligence lab; José Almeida, Computational Clinical Imaging lab; Margarida Caio, Stem Cells & Regeneration lab

Ad hoc Seminars

Ad hoc seminars feature external researchers in neuroscience, cancer, and physiology, invited by CR scientists to present their latest work. These seminars are designed to generate discussions on innovative approaches and current research trends, fostering a collaborative environment and promoting knowledge exchange among peers.

Theory Seminars

These sessions feature external theorists specialising in neuroscience or related fields, and aim to foster interactive discussions within the CR community.



As the CR community grows, its culture becomes more deeply rooted. Driven by its members, the primary efforts have focused on strengthening and supporting long-standing programmes and initiatives that foster cohesion and connection. At the heart of CR culture lies a shared commitment to advancing scientific collaboration and pursuing research excellence as a diverse and interdisciplinary collective endeavour.

Culture

CR Retreat

From 21 to 24 May, 244 CR members convened at the Grande Hotel do Luso in Luso, Portugal, to enhance the energy and cohesion of the CR community. Themed “The Rhythms of Life”, this year’s retreat explored how individual contributions can combine to create something greater than the sum of their parts. The focus was on finding balance in both professional and personal spheres, with discussions on how funding, work-life balance, and creativity at various career stages influence scientific productivity.
A significant highlight was the launch of CR Ignite, a new initiative designed to transform innovative ideas into actionable plans that improve the CR environment. Organised by the Retreat Committee, with the support of the Communication, Events and Outreach team, the retreat created an open, dynamic space for reflection, conversation, and community building.

CR Retreat Committee Ana Carolina Pádua, Mathematics of Behavior and Intelligence lab
Ana Queirós, Myeloma Lymphoma Research lab
Bruna Garcia, Cancer Dormancy and Immunity lab
Carlos Minutti, Immunoregulation lab
Carolina Filipe, Neural Dynamics lab
Charlie Rosher, Behavioural Neuroscience lab
Feray Feuerhake, Cortical Circuits lab
Jordi Torrents, Mathematics of Behavior and Intelligence lab
Laura Silva, System Neuroscience lab
Madalena Bettencourt (INDP 2023)
María Martínez-Lopez, Immunophysiology lab
Mariana Costa, Mathematics of Behavior and Intelligence lab
Susana Lima, Neuroethology lab
Yves Bernaerts, Neural Dynamics lab
Zuzanna Dedyk, System Neuroscience lab

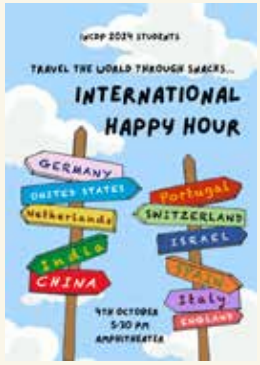
Baking Lab

helping is a piece of cake!

Once a month, members of the CR community come together to bake and sell homemade cakes, with all proceeds going to charitable causes. In 2024, 25 volunteers baked and sold 74 cakes, raising €1859 to support 11 causes across Social Welfare, Animal Welfare, Humanitarian Aid, Arts and Culture and Environmental Conservation. Helping is certainly a delicious and heartwarming piece of cake!

Mental Health and Wellbeing – Workshop Series

Organised by the PhD Students Committee, this series aimed to highlight the importance of mental wellbeing by providing students with tools to de-stress, along with practical strategies to manage the psychological challenges of a PhD and stay grounded and resilient throughout academic life. Sessions ranged from expert-led discussions on mental health in academia to hands-on experiences like art therapy and socioemotional skills training.
Guest speakers included Pedro Morgado (Life and Health Sciences Research Institute, University of Minho), who spoke about preventing burnout and psychiatric disorders; Anne-Claire Hoyaux (Professional Coach and Art Therapist), who introduced art therapy as a tool for balance and self-expression; and Patrícia Moreira (Faculty of Psychology and Educational Sciences, University of Porto) and Joana Ribeiro (Núcleo CASA – Psychology, Education and Development), who led a session on navigating emotional wellbeing.



←

Selection of happy hours posters produced by the CR groups.

Happy Hour

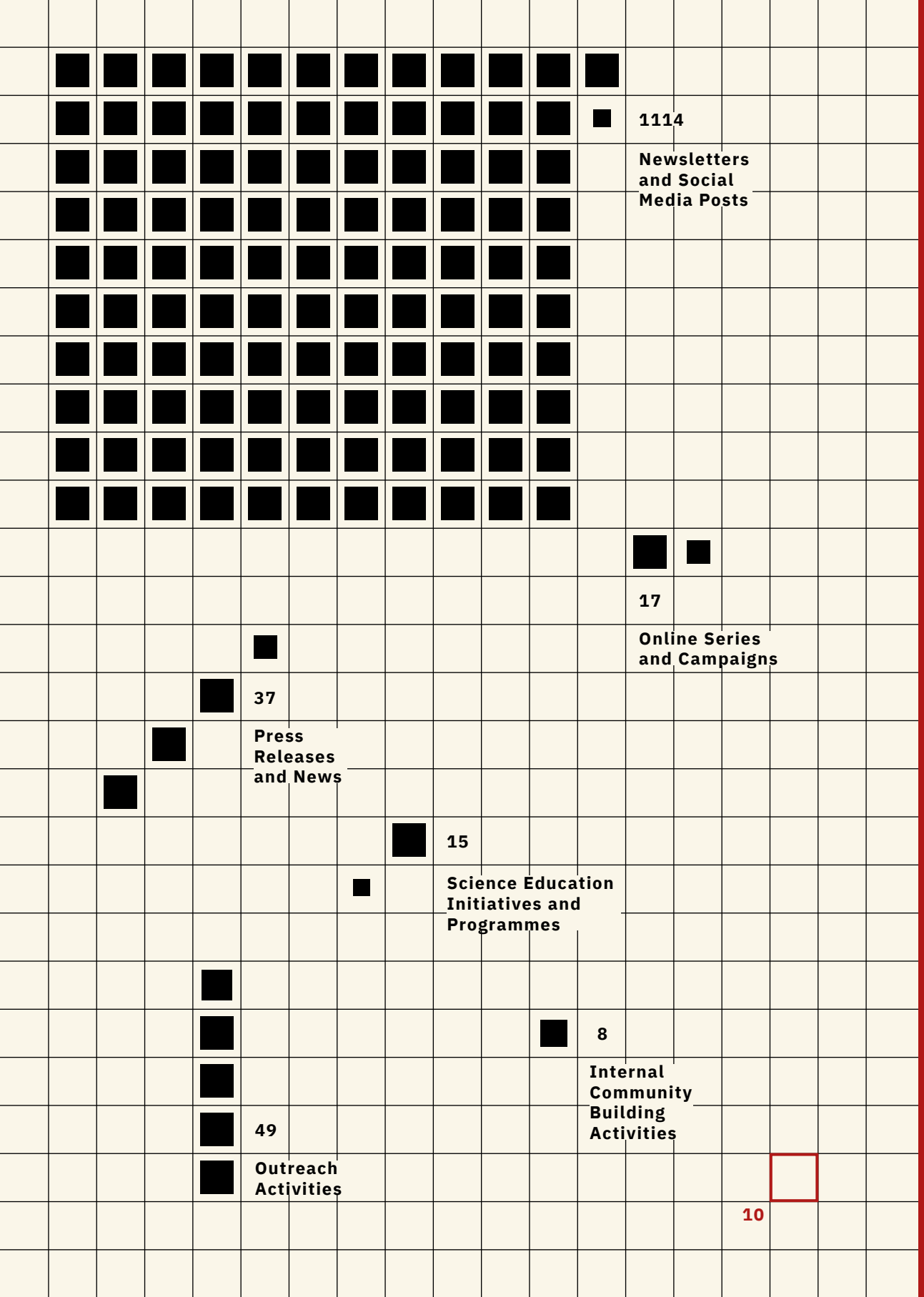
Every Friday, the community gathers to unwind and celebrate another week in the journey of science. Each week, two CR groups collaborate to host an often thematic social gathering that blends their diverse backgrounds, ideas, and camaraderie, fostering deeper connections and a stronger sense of belonging within the CR community.

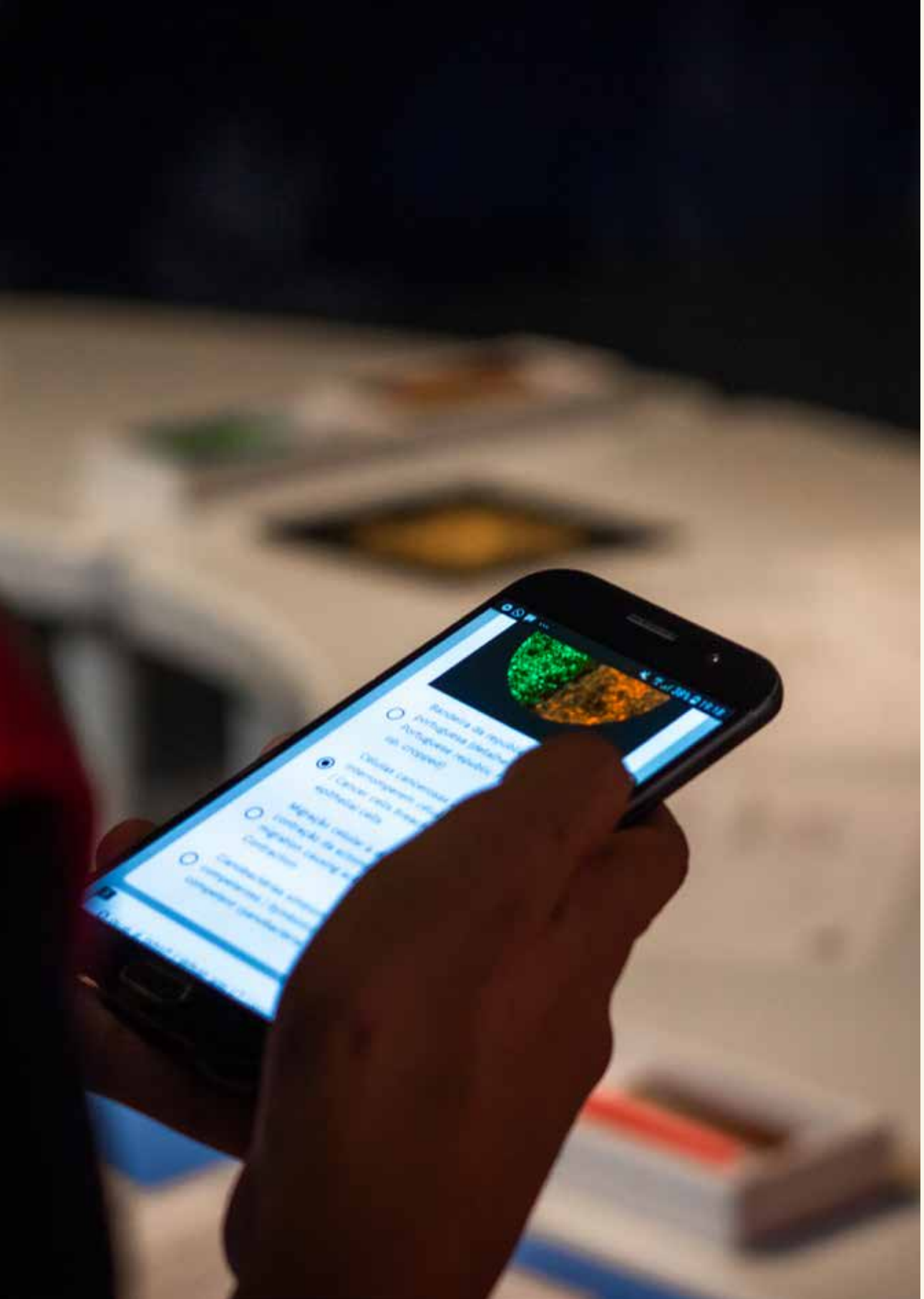
Magusto

For the fourth year running, the Support Units, Platforms and PhD students organised a traditional Magusto celebration in November. This cheerful event brings the entire CF community together to celebrate autumn in the Amphitheatre, featuring roasted chestnuts and traditional beverages such as jeropiga and Port wine.

Science Communication

One of the goals of Champalimaud Research (CR) is to share knowledge not only within the clinical and scientific communities, but also with society at large. Many Champalimaud Foundation (CF) members, at all career stages, adopt this vision by organising and participating in various outreach activities, both in and outside of CF. CR's science communication and outreach activities are promoted and facilitated by the Communication, Events and Outreach (CEO) team.





sharing stories of science

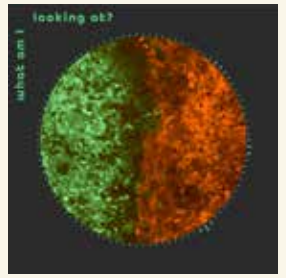
Highlights

In 2024, the CEO team designed and created engaging communication content – including online interactive series, news pieces, and campaigns – shared across all CF communication channels. To ensure the quality and relevance of these materials, the team worked closely with members of the internal community.

Digital storytelling gained new ground. The interactive online series *WAILA – What Am I Looking At?*, which combined striking scientific imagery with slick visuals, and accessible narration, was viewed over 150,000 times across CF's social media platforms. Several episodes quickly achieved high engagement and went viral. In addition, public awareness campaigns such as *Women & Girls in Science* and *BeOpen About Animal Research*, developed in close collaboration with the Animal Platforms teams, sparked dialogue on equity and ethics in science.

In 2024, a dynamic and diverse array of online communication content was produced – from multi-part series and thematic campaigns featured in this report to press releases, news updates, and announcements, all supported by engaging visual assets.

Content was strategically shared across CF and CR social media channels, leading to substantial growth in both audience size and engagement metrics on all platforms. The most significant increase occurred on LinkedIn, where the number of followers grew by 27% and engagement rose by 313%, reflecting a stronger connection with our audiences and greater visibility for our key messages.



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A selection of visual content created by the CEO team for online presence.

YouTube continued to be an effective platform for sharing video content. The 8 episodes of new series *What Am I Looking At?* (WAILA) – alongside the PhD Student Diaries – contributed to a significant increase in viewership, growing from just over 19,000 to more than 82,000 views over the course of the year. Notably, WAILA Episode 6, “A Skin-deep Secret”, went viral, attracting tens of thousands of views.

Facebook	142k	Followers
	74k	Interactions*
	403	Posts
Instagram	17k	
	32k	
	457	
LinkedIn	71k	
	95k	
	180	
X	15k	
	8k	
	602	

* number of engagements (e.g. comments, likes, shares)

Events

promoting scientific exchange and institutional visibility

Highlights

Events create powerful opportunities for generating scientific exchange, connecting communities, and showcasing the research ecosystem at CF. In 2024, the CEO team curated a diverse portfolio of high-impact events that reflected our institution's commitment to scientific excellence, collaboration, and knowledge dissemination. Flagship events included the *CR Retreat* and *Champalimaud Research Symposium (CRSy)*, the return of the *CR Colloquia Series*, the *6th European Conference on Brain Stimulation* (in partnership with the European Society for Brain Stimulation), and the *International Congress on Neurodegenerative Diseases* (in collaboration with Fundación CIEN and Fundación Reina Sofía).

Outreach

bridging the gap between science and society

Highlights

In 2024, a wide range of outreach activities reached diverse audiences – from underserved students and communities to families and adults curious about the latest scientific breakthroughs. Thanks to the strong commitment of many CR members and the support of key strategic partnerships, these initiatives helped bring science closer to society.

In 2024, the mentoring programme *Ciência di Noz Manera (CNM)* continued to make a strong impact, connecting 60 scientists with 200 students from underserved schools. Developed in partnership with GIMM and Native Scientists, CNM has reached 800 students and involved over 100 mentors since 2021.

Another standout initiative was *Science on the Walls*, a grassroots project operating under the motto, “No one is left behind: empowering young children's minds through art and science”. The year saw vibrant activity, including a series of workshops during Brain Awareness Week and a special summer camp held in the Cova da Moura neighbourhood.

Outreach extended further with 25 school visits to CF and strong community engagement at all three European Researchers' Nights held in Greater Lisbon, where participants experienced a range of multisensory science activities. The 2024 edition of *Metamersion – Healing Algorithms* also continued to blend science, technology, and art in informal settings.

Finally, the outreach initiative Ar, active since 2011, had a dynamic year, with two events focused on artificial intelligence – *Living with AI* and *Shaping Tomorrow’s Intelligence* – and one on water scarcity, *The State of Water*. These events featured 16 hosts and speakers, collectively drawing over 1,000 participants.

Engagement and Community Building

cultivating belonging through creative engagement

Highlights

Throughout the year, numerous activities helped foster a strong sense of connection and shared purpose among CR's internal community of over 500 members. CR's unique culture was reinforced through a combination of collaborative efforts, ranging from a diverse set of outreach initiatives – some of which are highlighted in this report – to internal activities designed to promote teamwork, celebration, and informal connections.

As part of these efforts, the team redesigned the internal weekly newsletter Life @CCU and planned and implemented a number of special initiatives, including *Operation Kite* (a celebration of the 25 April), the Magusto (an Iberian tradition celebrated on 8 November), and a collaborative Happy Hour dedicated to creating the 2024 Winter Card (13 December).

Next year marks an important milestone: the 20th anniversary of the Champalimaud Foundation's formal establishment. The CEO team is already actively exploring ways to commemorate this occasion – honouring not only the anniversary itself, but also the extraordinary legacy we have built together over the past two decades.

The nitty-gritty for those who want to know more about what we've done: publications, theses, external funding, scientific events, and outreach annexes.

Nitty Gritty

Publications

— Research Articles

Barbosa R, Mendonça MD, Bastos P, Pita Lobo P, Valadas A, Guedes LC, Ferreira JJ, Rosa MM, Matias R, Coelho M. (2024) 3D kinematics quantifies gait response to levodopa earlier and to a more comprehensive extent than the MDS-Unified Parkinson's Disease Rating Scale. Movement Disorders Clinical Practice. DOI: 10.1002/mdc3.14016.

Bentley G, Zamir O, Roziner I, Dahabre R, Perry S, Karademas EC, Poikonen-Saksela P, Mazzocco K, Oliveira-Maia AJ, Pat-Horenczyk R. (2024) Fear of cancer recurrence in breast cancer: A moderated serial mediation analysis of a prospective international study. Health Psychology. DOI: 10.1037/hea0001345.

Bergantim R, Geraldes C, João C, Lúcio P, Neves M, Trigo F, Pedrosa H, Ventura M, Santos S, Ramos D. (2024) The evolving treatment landscape of multiple myeloma in Portugal: a nation-wide retrospective cohort study of real-world clinical practice. EJHaem. DOI: 10.1002/jha2.1035.

Bessa JM, Cotovio G, Doellinger O, Freitas J, Lara E, Matos Pires A, Serra M, Martins de Amorim G, Filipa Pereira A, Oliveira-Maia AJ. (2024) Real-world evidence from a European cohort study of patients with treatment-resistant depression: Country-specific data for Portugal. Journal of Affective Disorders Reports. DOI: 10.1016/j.jadr.2024.100791.

Beumer-Chuwonpad A, Behr FM, van Alphen FPJ, Kragten NAM, Hoogendijk AJ, van den Biggelaar M, van Gisbergen KPJM. (2024) Intestinal tissue-resident memory T cells maintain distinct identity from circulating memory T cells after in vitro restimulation. European Journal of Immunology. DOI: 10.1002/eji.202350873.

Bilreiro C, Fernandes FF, Simões RV, Henriques R, Chavarrías C, Ianus A, Castillo-Martin M, Carvalho T, Matos C, Shemesh N. (2024) Pancreatic Intraepithelial Neoplasia Revealed by Diffusion-Tensor MRI. Investigative Radiology. DOI: 10.1097/RLI.0000000000001142.

Canário NS, Crisóstomo J, Duarte JV, Silva M, Silva C, Ferreira S, Castelo-Branco M. (2024) Irreversible atrophy in memory brain regions over 7 years is predicted by glycemic control in type 2 diabetes without mild cognitive impairment. Frontiers in Aging Neuroscience. DOI: 10.3389/fnagi.2024.1367563.

Canário NS, Crisóstomo J, Moreno C, Duarte JV, Duarte IC, Ribeiro MJ, Caramelo B, Gomes LV, Matafome P, Oliveira FP, Castelo-Branco M. (2024) Functional reorganization of memory processing in the hippocampus is associated with neuroprotector GLP-1 levels in type 2 diabetes. Heliyon. DOI: 10.1016/j.heliyon.2024.e27412.

Canato S, Sarate R, Carvalho-Marques S, Maia Soares R, Song Y, Monteiro-Ferreira S, Vieugué P, Liagre M, Grossi G, Cardoso E, Dubois C, Conway EM, Schenone S, Sánchez-Danés A, Blanpain C. (2024) Survivin promotes stem cell competence for skin cancer initiation. Cancer Discovery. DOI: 10.1158/2159-8290.CD-24-0263.

Costa B, Estrada MF, Gomes A, Fernandez LM, Azevedo JM, Póvoa V, Fontes M, Alves A, Galzerano A, Castillo-Martin M, Herrando I, Brandão S, Carneiro C, Nunes V, Carvalho C, Parvaiz A, Marreiros A, Fior R. (2024) Zebrafish Avatar-test forecasts clinical response to chemotherapy in patients with colorectal cancer. Nature Communications. DOI: 10.1038/s41467-024-49051-0.

Crombie D, Spacek MA, Leibold C, Busse L. (2024) Spiking activity in the visual thalamus is coupled to pupil dynamics across temporal scales. PLOS Biology. DOI: 10.1371/journal.pbio.3002614.

Dahabre R, Bentley G, Poikonen-Saksela P, Mazzocco K, Sousa B, Pat-Horenczyk R. (2024) Can mindfulness facilitate posttraumatic growth in breast cancer patients? The mediating role of illness perceptions and positive emotions. Journal of Health Psychology. DOI: 10.1177/13591053231223484.

de Sena-Tomás C, Lameira LR, da Costa MR, Taborda PN, Laborde A, Orger MB, de Oliveira S, Saúde L. (2024) Neutrophil immune profile guides spinal cord regeneration in zebrafish. Brain, Behavior, and Immunity. DOI: 10.1016/j.bbi.2024.06.022.

Dias RF, Rajan R, Baeta M, Belbut B, Marques T, Petreanu L. (2024) Visual experience reduces the spatial redundancy between cortical feedback inputs and primary visual cortex neurons. Neuron. DOI: 10.1016/j.neuron.2024.07.009.

Dorkenwald S, Matsliah A, Sterling AR, Schlegel P, Yu S, McKellar CE, Lin A, Costa M, Eichler K, Yin Y, Silversmith W, Schneider-Mizell C, Jordan CS, Brittain D, Halageri A, Kuehner K, Ogedengbe O, Morey R, Gager J, Kruk K, Perlman E, Yang R, Deutsch D, Bland D, Sorek M, Lu R, Macrina T, Lee K, Bae JA, Mu S, Nehoran B, Mitchell E, Popovych S, Wu J, Jia Z, Castro MA, Kemnitz N, Ih D, Bates AS, Eckstein N, Funke J, Collman F, Bock DD, Jefferis GSXE, Seung HS, Murthy M, and the FlyWire Consortium. (2024) Neuronal wiring diagram of an adult brain. Nature. DOI: 10.1038/s41586-024-07558-y.

Douglas A, Stevens B, Rendas M, Kane H, Lynch E, Kunkemoeller B, Wessendorf-Rodriguez K, Day EA, Sutton C, Brennan M, O'Brien K, Kohlgruber AC, Prendeville H, Garza AE, O'Neill LAJ, Mills KHG, Metallo CM, Veiga-Fernandes H, Lynch L. (2024) Rhythmic IL-17 production by γδ T cells maintains adipose de novo lipogenesis. Nature. DOI: 10.1038/s41586-024-08131-3.

Faro Viana F, Cotovio G, da Silva DR, Seybert C, Pereira P, Silva A, Carvalho F, Oliveira-Maia AJ. (2024) Reducing motor evoked potential amplitude variability through normalization. Frontiers in Psychiatry. DOI: 10.3389/fpsyt.2024.1279072.

Félix R, Markov DA, Renninger SL, Tomás AR, Laborde A, Carey MR, Orger MB, Portugues R. (2024) Structural and functional organization of visual responses in the inferior olive of larval zebrafish. Journal of Neuroscience. DOI: 10.1523/JNEUROSCI.2352-21.2023.

Fernandez Velasco P, Griesbauer EM, Brunec IK, Morley J, Manley E, McNamee DC, Spiers HJ. (2025) Expert navigators deploy rational complexity-based decision precaching for large-scale real-world planning. Proceedings of the National Academy of Sciences of the United States of America. DOI: 10.1073/pnas.2407814122.

Fieuws C, Bek JW, Parton B, De Neef E, De Wever O, Hoorne M, Estrada MF, Van Dorpe J, Denys H, Van de Vijver K, Claes KBM. (2024) Zebrafish avatars: toward functional precision medicine in low-grade serous ovarian cancer. Cancers. DOI: 10.3390/cancers16101812.

Fonseca J, Moraes-Fontes MF, Sousa I, Oliveira F, Froes G, Gaivão A, Palmas A, Rebola J, Muresan C, Santos T, Dias D, Varandas M, Lopez-Beltran A, Ribeiro R, Fraga A. (2024) Membranous urethral length is the single independent predictor of urinary continence recovery at 12 months following Retzius-sparing robot-assisted radical prostatectomy. Journal of Robotic Surgery. DOI: 10.1007/s11701-024-01986-8.

Fragoso Fonseca A, Coelho R, Lopes-da-Silva M, Lemos L, Hall MJ, Oliveira D, Falcão AS, Tenreiro S, Seabra MC, Antas P. (2024) Modeling choroideremia disease with isogenic induced pluripotent stem cells. Stem Cells and Development. DOI: 10.1089/scd.2024.0105.

Giampazolias E, Pereira da Costa M, Lam KC, Lim KHJ, Cardoso A, Piot C, Chakravarty P, Blasche S, Patel S, Biram A, Castro-Dopico T, Buck MD, Rodrigues RR, Poulsen GJ, Palma-Duran SA, Rogers NC, Koufaki MA, Minutti CM, Wang P, Vdovin A, Frederico B, Childs E, Lee S, Simpson B, Iseppon A, Omenetti S, Kelly G, Goldstone R, Nye E, Suárez-Bonnet A, Priestnall SL, MacRae JI, Zelenay S, Patil KR, Litchfield K, Lee JC, Jess T, Goldszmid RS, Reis e Sousa C. (2024) Vitamin D regulates microbiome-dependent cancer immunity. Science. DOI: 10.1126/science.adh7954.

Gil R, Valente M, Shemesh N. (2024) Rat superior colliculus encodes the transition between static and dynamic vision modes. Nature Communications. DOI: 10.1038/s41467-024-44934-8.

Grenhas M, Lopes R, Ferreira BV, Barahona F, João C, Carneiro EA. (2024) Size-exclusion chromatography: a path to higher yield and reproducibility compared to sucrose cushion ultracentrifugation for extracellular vesicle isolation in multiple myeloma. International Journal of Molecular Sciences. DOI: 10.3390/ijms25158496.

Gutierrez-Castellanos N, Husain BFA, Dias IC, Nomoto K, Duarte MA, Ferreira L, Lacoste B, Lima SQ. (2024) A hypothalamic node for the cyclical control of female sexual rejection. Neuron. DOI: 10.1016/j.neuron.2024.10.026.

Gutierrez-Castellanos N, Sarra D, Godinho BS, Mainen ZF. (2024) Maturation of cortical input to dorsal raphe nucleus increases behavioral persistence in mice. eLife. DOI: 10.7554/eLife.93485.

Heinemans M, Moita MA. (2024) Looming stimuli reliably drive innate defensive responses in male rats, but not learned defensive responses. Scientific Reports. DOI: 10.1038/s41598-024-70256-2.

Herrando AI, Castillo-Martin M, Galzerano A, Fernández L, Vieira P, Azevedo J, Parvaiz A, Cicchi R, Shcheslavskiy VI, Silva PG, Lagarto JL. (2024) Dual excitation spectral autofluorescence lifetime and reflectance imaging for fast macroscopic characterization of tissues. Biomedical Optics Express. DOI: 10.1364/BOE.505220.

Herrando AI, Fernández LM, Azevedo J, Vieira P, Domingos H, Galzerano A, Shcheslavskiy VI, Heald RJ, Parvaiz A, Silva PG, Castillo-Martin M, Lagarto JL. (2024) Detection and characterization of colorectal cancer by autofluorescence lifetime imaging on surgical specimens. Scientific Reports. DOI: 10.1038/s41598-024-74224-8.

Jaccard A, Bridoux F, Roeloffzen W, Minnema MC, Bergantim R, Hájek R, João C, Cibeira MT, Palladini G, Schönland S, Merlini G, Milani P, Dimopoulos MA, Ravichandran S, Hegenbart U, Agis H, Gros B, Asra A, Magarotto V, Cheliotis G, Psarros G, Sonneveld P, Wechalekar A, Kastritis E. (2024) Healthcare resource utilization and cost-of-illness in systemic light chain (AL) amyloidosis in Europe: results from the real-world, retrospective EMN23 study. Clinical Lymphoma, Myeloma & Leukemia. DOI: 10.1016/j.clml.2024.01.013.

Justo-Henriques SI, Pérez-Sáez E, Carvalho JO, Lemos R, Ribeiro Ó. (2024) Effects of an individual cognitive stimulation intervention on global cognition, memory, and executive function in older adults with mild to moderate Alzheimer's disease. The Clinical Neuropsychologist. DOI: 10.1080/13854046.2024.2416568.

Lopes-Bastos B, Nabais J, Ferreira T, Allavena G, El Maï M, Bird M, Targen S, Tattini L, Kang D, Yue JX, Liti G, Carvalho TG, Godinho Ferreira M. (2024) The absence of telomerase leads to immune response and tumor regression in zebrafish melanoma. Cell Reports. DOI: 10.1016/j.celrep.2024.115035.

Lopez-Blanch L, Rodríguez-Marin C, Mantica F, Iñiguez LP, Permanyer J, Kita EM, Mackensen T, Codina-Tobias M, Romero-Ferrero F, Fernandez-Albert J, Cuadrado M, Bustelo XR, de Polavieja GG, Irimia M. (2024) Phenotypic impact of individual conserved neuronal microexons and their master regulators in zebrafish. eLife. DOI: 10.7554/eLife.104275.

Madan E, Palma AM, Vudatha V, Kumar A, Bhoopathi P, Wilhelm J, Bernas T, Martin PC, Bilolikar G, Gogna A, Peixoto ML, Dreier I, Araujo TF, Garre E, Gustafsson A, Dorayappan KDP, Mamidi N, Sun Z, Yekelchyk M, Accardi D, Olsen AL, Lin L, Titelman AA, Bianchi M, Jessmon P, Farid EA, Pradhan AK, Neufeld L, Yeini E, Maji S, Pelham CJ, Kim H, Oh D, Rolfsnes HO, Marques RC, Lu A, Nagane M, Chaudhary S, Gupta K, Gogna KC,

Bigio A, Bhoopathi K, Mannangatti P, Achary KG, Akhtar J, Belião S, Das S, Correia I, da Silva CL, Fialho AM, Poellmann MJ, Javius-Jones K, Hawkridge AM, Pal S, Shree KS, Rakha EA, Khurana S, Xiao G, Zhang D, Rijal A, Lyons C, Grossman SR, Turner DP, Pillappa R, Prakash K, Gupta G, Robinson GLWG, Koblinski J, Wang H, Singh G, Singh S, Rayamajhi S, Bacolod MD, Richards H, Sayeed S, Klein KP, Chelmow D, Satchi-Fainaro R, Selvendiran K, Connolly D, Thorsen FA, Bjerkvig R, Nephew KP, Idowu MO, Kühnel MP, Moskaluk C, Hong S, Redmond WL, Landberg G, Lopez-Beltran A, Poklepovic AS, Sanyal A, Fisher PB, Church GM, Menon U, Drapkin R, Godwin AK, Luo Y, Ackermann M, Tzankov A, Mertz KD, Jonigk D, Tsung A, Sidransky D, Trevino J, Saavedra AP, Winn R, Won KJ, Moreno E, Gogna R. (2024) Ovarian tumor cells gain competitive advantage by actively reducing the cellular fitness of microenvironment cells. Nature Biotechnology. DOI: 10.1038/s41587-024-02453-3.

Martínez-López MF, de Almeida CR, Fontes M, Mendes RV, Kaufmann SHE, Fior R. (2024) Macrophages directly kill bladder cancer cells through TNF signaling as an early response to BCG therapy. Disease Models & Mechanisms. DOI: 10.1242/dmm.050693.

Mazo C, Baeta M, Petreanu L. (2024) Auditory cortex conveys non-topographic sound localization signals to visual cortex. Nature Communications. DOI: 10.1038/s41467-024-47546-4.

McIntyre RS, Bitter I, Buyze J, Fagiolini A, Godinov Y, Gorwood P, Ito T, Oliveira-Maia AJ, Vieta E, Werner-Kiechle T, Young AH, Reif A. (2024) Safety and tolerability of esketamine nasal spray versus quetiapine extended release in patients with treatment resistant depression. European Neuropsychopharmacology. DOI: 10.1016/j.euroneuro.2024.05.009.

Mendonça MD, Alves da Silva J, Hernandez LA, Casela I, Obeso J, Costa RM. (2024) Dopamine neuron activity encodes the length of upcoming contralateral movement sequences. Current Biology. DOI: 10.1016/j.cub.2024.01.067.

Mendonça MD, Ferreira PC, Barbosa R, da Silva JA. (2024) Brain-first forms of Parkinson's disease are over-represented in patients with non-responsive resting tremor. Neurobiology of Disease. DOI: 10.1016/j.nbd.2024.106691.

Mendonça MD, Ferreira PC, da Silva JA. (2024) Ipsilateral association between rest tremor and striatal binding is likely spurious. Movement Disorders. DOI: 10.1002/mds.30099.

Mendonça MD, Ferreira PC, Oliveira F, Barbosa R, Meira B, Costa DC, Oliveira-Maia AJ, da Silva JA. (2024) Relative sparing of dopaminergic terminals in the caudate nucleus is a feature of rest tremor in Parkinson's disease. NPJ Parkinson's Disease. DOI: 10.1038/s41531-024-00818-8.

Minutti CM, Piot C, Pereira da Costa M, Chakravarty P, Rogers N, Huerga Encabo H, Cardoso A, Loong J, Bessou G, Mionnet C, Langhorne J, Bonnet D, Dalod M, Tomasello E, Reis e Sousa C. (2024) Distinct ontogenetic lineages dictate cDC2 heterogeneity. Nature Immunology. DOI: 10.1038/s41590-024-01745-9.

Mollet I, Ricardo Viana-Soares R, Pires C, Soares NL, Marto JP, Mendonça MD, Queiroga C, Carvalho AS, Sequeira CO, Aloria K, Couraud PO, Pereira SA, Matthiesen R, Viana-Baptista M, Vieira HLA. (2024) Identification of human circulating factors following remote ischemic conditioning (RIC): potential impact on stroke. Free Radical Biology and Medicine. DOI: 10.1016/j.freeradbiomed.2024.08.017.

Mouret RZ, Greenbaum JP, Doll HM, Brody EM, Iacobucci EL, Roland NC, Simamora RC, Ruiz I, Seymour R, Ludwick L, Krawitz JA, Groneberg AH, Marques JC, Laborde A, Rajan G, Del Bene F, Orger MB, Jain RA. (2024) The adaptor protein 2 (AP2) complex modulates habituation and behavioral selection across multiple pathways and time windows. iScience. DOI: 10.1016/j.isci.2024.109455.

Neves M, Gerivaz R, Esteves G, Bergantim R, Ferreira G, Coelho H, Afonso C, Duarte D, Neves A, Matos Silva H, Caetano J, Jaime R, Geraldes C, Lúcio P. (2024) Prevalence of measurable residual disease in patients with refractory/relapsed multiple myeloma who reached complete response: a cross-sectional multicentric study. Frontiers in Hematology. DOI: 10.3389/frhem.2024.1480120.

Oliveira C, Oliveira F, Constantino C, Alves C, Brito MJ, Cardoso F, Costa DC. (2024) Baseline [18F] FDG PET/CT and MRI first-order breast tumor features do not improve pathological complete response prediction to neoadjuvant chemotherapy. European Journal of Nuclear Medicine and Molecular Imaging. DOI: 10.1007/s00259-024-06815-6.

Oliveira-Maia AJ, Rive B, Godinov Y, Mulhern-Haughey S. (2024) Estimating the benefit of esketamine nasal spray versus real-world treatment on patient-reported functional remission: Results from the ICEBERG study. Frontiers in Psychiatry. DOI: 10.3389/fpsyt.2024.1459633.

Perera C, Cruz R, Shemesh N, Carvalho T, Thomas DL, Wells J, Ianuș A. (2024) Non-invasive MRI of blood-cerebrospinal fluid-barrier function in a mouse model of Alzheimer's disease: a potential biomarker of early pathology. Fluids and Barriers of the Central Nervous System. DOI: 10.1186/s12987-024-00597-7.

Pires Monteiro S, Hirschler L, Barbier EL, Figueiredo P, Shemesh N. (2025) High-resolution perfusion imaging in rodents using pCASL at 9.4 T. NMR in Biomedicine. DOI: 10.1002/nbm.5288.

Podlaski WF, Machens CK. (2024) Approximating nonlinear functions with latent boundaries in low-rank excitatory-inhibitory spiking networks. Neural Computation. DOI: 10.1162/neco_a_01658.

Poikonen-Saksela P, Karademas E, Vehmanen L, Utriainen M, Kondylakis H, Kourou K, Manikis GC, Kolokotroni E, Argyropaidas P, Sousa B, Pat Horenczyk R, Mazzocco K, Mattson J. (2024) Digital self-management intervention paths for early breast cancer patients: Results of a pilot study. The Breast Journal. DOI: 10.1155/2024/8036696.

Porte R, Belloy M, Audibert A, Bassot E, Aïda A, Alis M, Miranda-Capet R, Jourdes A, van Gisbergen KPJM, Masson F, Blanchard N. (2024) Protective function and differentiation cues of brain-resident CD8+ T cells during surveillance of latent Toxoplasma gondii infection. Proceedings of the National Academy of Sciences of the United States of America. DOI: 10.1073/pnas.2403054121.

Reis JC, Travado L, Heller AS, Oliveira FPM, Almeida SD, Sousa B, Costa DC, Antoni MH. (2024) Greater perceived stress management skills and heightened brain metabolic activity in cortical and subcortical stress processing regions in metastatic breast cancer patients. Brain Imaging and Behavior. DOI: 10.1007/s11682-023-00821-2.

Ribeiro G, Fernandes AB, Oliveira FPM, Duarte JS, Oliveira M, Limbert C, Costa RM, Costa DC, Oliveira-Maia AJ. (2024) Postingestive reward acts through behavioral reinforcement and is conserved in obesity and after bariatric surgery. PLOS Biology. DOI: 10.1371/journal.pbio.3002936.

Rodrigues FS, Monteiro T, Motiwala A, Paton JJ. (2024) The dorsolateral striatum encodes a temporal basis for the organization of behavior. Neuron. DOI: 10.1016/j.neuron.2024.10.022.

Rodrigues NM, Almeida JG, Rodrigues A, Vanneschi L, Matos C, Lisitskaya MV, Uysal A, Silva S, Papanikolaou N. (2024) Deep learning features can improve radiomics-based prostate cancer aggressiveness prediction. JCO Clinical Cancer Informatics. DOI: 10.1200/CCI.23.00180.

Rodrigues NM, Almeida JG, Verde ASC, Gaivão AM, Bilreiro C, Santiago I, Ip J, Belião S, Moreno R, Matos C, Vanneschi L, Tsiknakis M, Marias K, Regge D, Silva S; ProCAncer-I Consortium; Papanikolaou N. (2024) Analysis of domain shift in whole prostate gland, zonal and lesions segmentation and detection, using multicentric retrospective data. Computers in Biology and Medicine. DOI: 10.1016/j.compbiomed.2024.108216.

Rosenberg T, Möller S, Abildgaard N, Nørgaard JN, Lysén A, Tsykonova G, João C, Vangsted A, Schjesvold F, Nielsen LK. (2024) Health-related quality of life during carfilzomib–lenalidomide–dexamethasone consolidation: findings from the multiple myeloma CONPET study. European Journal of Haematology. DOI: 10.1111/ejh.14358.

Sandgaard AD, Kiselev VG, Henriques RN, Shemesh N, Jespersen SN. (2024) Incorporating the effect of white matter microstructure in the estimation of magnetic susceptibility in ex vivo mouse brain. Magnetic Resonance in Medicine. DOI: 10.1002/mrm.29867.

Sandgaard AD, Shemesh N, Østergaard L, Kiselev VG, Jespersen SN. (2024) The Larmor frequency shift of a white matter magnetic microstructure model with multiple sources. NMR in Biomedicine. DOI: 10.1002/nbm.5150.

Schlegel P, Yin Y, Bates AS, Dorkenwald S, Eichler K, Brooks P, Han DS, Gkantia M, dos Santos M, Munnelly EJ, Badalamente G, Serratosa Capdevila L, Sane VA, Fragniere AMC, Kiassat L, Pleijzier MW, Stürner T, Tamimi IFM, Dunne CR, Salgarella I, Javier A, Fang S, Perlman E, Kazimiers T, Jagannathan SR, Matsliah A, Sterling AR, Yu S, McKellar CE, FlyWire Consortium, Costa M, Seung HS, Murthy M, Hartenstein V, Bock DD, Jefferis GSXE. (2024) Whole-brain annotation and multi-connectome cell typing of Drosophila. Nature. DOI: 10.1038/s41586-024-07686-5.

Šestan M, Mikašinović S, Benić A, Wueest S, Dimitropoulos C, Mladenić K, Krapić M, Hiršl L, Glantzspiegel Y, Rasteiro A, Aliseychik M, Cekinović Grbeša Đ, Turk Wensveen T, Babić M, Gat-Viks I, Veiga-Fernandes H, Konrad D, Wensveen FM, Polić B. (2024) An IFNγ-dependent immune–endocrine circuit lowers blood glucose to potentiate the innate antiviral immune response. Nature Immunology. DOI: 10.1038/s41590-024-01848-3.

Silva A, Carriço P, Fernandes AB, Saraiva T, Oliveira-Maia AJ, da Silva JA. (2024) High-precision optical fiber-based lickometer. eNeuro. DOI: 10.1523/ENEURO.0189-24.2024.

Silva A, Carvalho F, Cruz BF. (2024) High-performance wide-band open-source system for acoustic stimulation. HardwareX. DOI: 10.1016/j.ohx.2024.e00555.

Silva NT, Ramírez-Buriticá J, Pritchett DL, Carey MR. (2024) Climbing fibers provide essential instructive signals for associative learning. Nature Neuroscience. DOI: 10.1038/s41593-024-01594-7.

Simões RV, Henriques RN, Olesen JL, Cardoso BM, Fernandes FF, Monteiro MAV, Jespersen SN, Carvalho T, Shemesh N. (2024) Deuterium metabolic imaging phenotypes mouse glioblastoma heterogeneity through glucose turnover kinetics. eLife. DOI: 10.7554/eLife.100570.3.

Sridhar G, Vergassola M, Marques JC, Orger MB, Costa AC, Wyart C. (2024) Uncovering multiscale structure in the variability of larval zebrafish navigation. Proceedings of the National Academy of Sciences. DOI: 10.1073/pnas.2410254121.

Steinfeld R, Tacão-Monteiro A, Renart A. (2024) Differential representation of sensory information and behavioral choice across layers of the mouse auditory cortex. Current Biology. DOI: 10.1016/j.cub.2024.04.040.

Suraci D, Baria E, Tirloni L, Lagarto JL, Buccianti S, Agostini C, Pillozzi S, Antonuzzo L, Taddei A, Cicchi R. (2024) Delineation of gastrointestinal tumors biopsies using a fluorescence lifetime imaging optical fiber probe. Journal of Biophotonics. DOI: 10.1002/jbio.202400122.

Unnikrishnan VB, Sabatino V, Amorim F, Estrada MF, Navo CD, Jimenez-Oses G, Fior R, Bernardes GJL. (2024) Gold(III)-induced amide bond cleavage in vivo: a dual release strategy via π-acid mediated allyl substitution. Journal of the American Chemical Society. DOI: 10.1021/jacs.4c05582.

Viana FF, Cotovio G, da Silva DR, Seybert C, Pereira P, Silva A, Carvalho F, Oliveira-Maia AJ. (2024) Reducing motor evoked potential amplitude variability through normalization. Frontiers in Psychiatry. DOI: 10.3389/fpsyt.2024.1279072.

— Reviews and Perspectives

Alcolea MP, Alonso-Curbelo D, Ambrogio C, Bullman S, Correia AL, Ernst A, Halbrook CJ, Kelly GL, Lund AW, Quail DF, Ruscetti M, Shema E, Stromnes IM, Tam WL. (2024) Cancer hallmarks: piecing the puzzle together. Cancer Discovery. DOI: 10.1158/2159-8290.CD-24-0097.

Almeida S, Frasquilho D, Cordeiro MT, Neto T, Sousa B, Cardoso F, Oliveira-Maia AJ. (2024) The impact of the COVID-19 pandemic on mental health and cognitive function in patients with cancer: A systematic literature review. Cancer Reports. DOI: 10.1002/cnr2.70008.

Antas P, Carvalho C, Cabral-Teixeira J, de Lemos L, Seabra MC. (2024) Toward low-cost gene therapy: mRNA-based therapeutics for treatment of inherited retinal diseases. Trends in Molecular Medicine. DOI: 10.1016/j.molmed.2023.11.009.

Arlandis Castro J. (2024) Hypnosis, aesthetics, and sociality: on how images can create experiences. Open Philosophy. DOI: 10.1515/opphil-2024-0052.

Borst R, Meyaard L, Pascoal Ramos MI. (2024) Understanding the matrix: collagen modifications in tumors and their implications for immunotherapy. Journal of Translational Medicine. DOI: 10.1186/s12967-024-05199-3.

Carey MR. (2024) The cerebellum. Current Biology. DOI: 10.1016/j.cub.2023.11.048.

Drapela S, Garcia BM, Gomes AP, Correia AL. (2024) Metabolic landscape of disseminated cancer dormancy. Trends in Cancer. DOI: 10.1016/j.trecan.2024.10.005.

Drapela S, Garcia BM, Gomes AP, Correia AL. (2024). Metabolic landscape of disseminated cancer dormancy. Trends in Cancer, 10(1), 1–13. DOI: 10.1016/j.trecan.2024.100224.

Geraldes C, Roque A, Sarmento-Ribeiro AB, Neves M, Ionita A, Gerivaz R, Tomé A, Afonso S, Silveira MP, Sousa P, Bergantim R, João C. (2024) Practical management of disease-related manifestations and drug toxicities in patients with multiple myeloma. Frontiers in Oncology. DOI: 10.3389/fonc.2024.1282300.

Groheux D, Vaz SC, Poortmans P, Mann RM, Ulaner GA, Cook GJ, Hindié E, Woll JPP, Jacene H, Rubio IT, Vrancken Peeters MJ, Dibble EH, de Geus-Oei LF, Graff SL, Cardoso F. (2024) Role of [18F]FDG PET/CT in patients with invasive breast carcinoma of no special type: Literature review and comparison between guidelines. The Breast. DOI: 10.1016/j.breast.2024.103806.

Gutierrez-Castellanos N, Dias IC, Husain BFA, Lima S. (2024) Functional diversity along the anteroposterior axis of the ventromedial hypothalamus. Journal of Neuroendocrinology. DOI: 10.1111/jne.13447.

Horvat N, Papanikolaou N, Koh DM. (2024) Radiomics Beyond the Hype: A Critical Evaluation Toward Oncologic Clinical Use. Radiology: Artificial Intelligence. DOI: 10.1148/ryai.230437.

Maia A, Tarannum M, Lérias JR, Piccinelli S, Borrego LM, Maeurer M, Romee R, Castillo-Martin M. (2024) Building a better defense: expanding and improving natural killer cells for adoptive cell therapy. Cells. DOI: 10.3390/cells13050451.

McIntyre RS, Kwan ATH, Mansur RB, Oliveira-Maia AJ, Teopiz KM, Maletic V, Suppes T, Stahl SM, Rosenblat JD. (2025) Psychedelics for the treatment of psychiatric disorders: Interpreting and translating available evidence and guidance for future research. American Journal of Psychiatry. DOI: 10.1176/appi.ajp.20230902.

McNamee DC. (2024) The generative neural microdynamics of cognitive processing. Current Opinion in Neurobiology. DOI: 10.1016/j.conb.2024.102855.

Oliveira-Maia AJ, Bobrowska A, Constant E, Ito T, Kambarov Y, Luedke H, Mulhern-Haughey S, von Holt C. (2024) Treatment-resistant depression in real-world clinical practice: A systematic literature review of data from 2012 to 2022. Advances in Therapy. DOI: 10.1007/s12325-023-02700-0.

Pais ML, Crisóstomo J, Abrunhosa A, Castelo-Branco M. (2025) Central dopamine receptors: radiotracers unveiling the role of dopaminergic tone in obesity. Journal of Molecular Medicine. DOI: 10.1007/s00109-024-02501-0.

Sandru AR. (2024) Relational or object-oriented? A dialogue between two contemporary ontologies. Open Philosophy. DOI: 10.1515/opphil-2024-0022.

Seybert C, Schimmers N, Silva L, Breeksema JJ, Veraart J, Bessa BB, d'Orsi D, Schoevers RA, Oliveira-Maia AJ. (2024) Quality of reporting on psychological interventions in psychedelic treatments: a systematic review. The Lancet Psychiatry. DOI: 10.1016/S2215-0366(24)00333-X.

Swanton C, Bernard E, Abbosh C, André F, Auwerx J, Balmain A, Bar-Sagi D, Bernards R, Bullman S, DeGregori J, Elliott C, Erez A, Evan G, Febbraio MA, Hidalgo A, Jamal-Hanjani M, Joyce JA, Kaiser M, Lamia K, Locasale JW, Loi S, Malanchi I, Merad M, Musgrave K, Patel KJ, Quezada SA, Wargo JA, Weeraratna A, White E, Winkler F, Wood JN, Vousden KH, Hanahan D. (2024) Embracing cancer complexity: Hallmarks of systemic disease. Cell. DOI: 10.1016/j.cell.2024.02.009.

Ulaner GA, Carrilho Vaz S. (2024) Women's health update: growing role of PET for patients with breast cancer. Seminars in Nuclear Medicine. DOI: 10.1053/j.semnuclmed.2024.01.007.

Ulaner GA, Carrilho Vaz S, Groheux D. (2024) Quarter-Century Transformation of Oncology: Positron Emission Tomography for Patients with Breast Cancer. PET Clinics. DOI: 10.1016/j.cpet.2023.12.002.

— Conference Proceedings

Constantino CS, Oliveira FPM, Leocádio S, Silva M, Oliveira C, Castanheira JC, Silva Â, Teixeira R, Matos C, Vieira S, Kociolek J, Costa DC. (2024) A robust deep-learning model for fully automatic segmentation of lymphoma lesions on whole-body [18F]FDG PET/CT images. Proceedings of the 2024 IEEE International Symposium on Biomedical Imaging (ISBI). DOI: 10.1109/ISBI56570.2024.10635135.

Dowling M, Zhao Y, Park IM. (2024) eXponential FAmily Dynamical Systems (XFADS): large-scale nonlinear Gaussian state-space modeling. Advances in Neural Information Processing Systems. URL: https://openreview.net/forum?id=Ln8ogihZ2S.

Jeon H, Park IM. (2024) Quantifying signal-to-noise ratio in neural latent trajectories via Fisher information. Proceedings of the 32nd European Signal Processing Conference (EUSIPCO). URL: https://arxiv.org/abs/2408.08752.

Miranda C, Ferreira M, Domingues I, Pinheiro H, Ramos C. (2024) Impacto de programa de mentorias com cientistas em comunidades desservidas. SciComPt2024 – Linguagens e Vozes para uma Ciência Acessível. DOI 10.5281/zenodo.14535131

Mullen TS, Schimel M, Hennequin G, Machens CK, Orger MB, Jouary A. (2024) Learning interpretable control inputs and dynamics underlying animal locomotion. Proceedings of the Twelfth International Conference on Learning Representations (ICLR). URL: https://openreview.net/forum?id=MFCjgEOLJT

Ramos C, Debs M, Socorro S, Patarra R, Figueiredo D, Ferreira M, Moscoso J. (2024) Noite Europeia dos Investigadores: Como medir o seu impacto? SciComPt2024 – Linguagens e Vozes para uma Ciência Acessível. DOI 10.5281/zenodo.14535131

Ságodi Á, Martín-Sánchez G, Sokół P, Park IM. (2024) Back to the continuous attractor. Advances in Neural Information Processing Systems (NeurIPS). URL: https://openreview.net/forum?id=fvG6ZHrH0B.

Santos SJR, Niculae V, McNamee DC, Martins A. (2024) Sparse and structured Hopfield networks. Proceedings of the 41st International Conference on Machine Learning. Proceedings of Machine Learning Research, 235:43368–43388.

Vermani A, Dowling M, Jeon H, Jordan I, Nassar J, Bernaerts Y, Zhao Y, Van Vaerenbergh S, Park IM. (2024) Real-time machine learning strategies for a new kind of neuroscience experiments. Proceedings of the 32nd European Signal Processing Conference (EUSIPCO). URL: https://arxiv.org/abs/2409.01280.

Vermani A, Park IM, Nassar J. (2024) Leveraging generative models for unsupervised alignment of neural time series data. International Conference on Learning Representations (ICLR). URL: https://openreview.net/forum?id=9zhHVyLY4K

— Preprints

Bertolini E, Münch D, Pascual J, Sgammeglia N, Ribeiro C, Auer TO. (2024) Evolution of taste processing shifts dietary preference. bioRxiv. DOI: 10.1101/2024.10.11.617601.

Bimbard C, Takács F, Catarino JA, Fabre JMJ, Gupta S, Lenzi SC, Melin MD, O'Neill N, Robacha M, Street JS, Teixeira J, Townsend S, van Beest EH, Zhang AM, Churchland AK, Harris KD, Kullmann DM, Lignani G, Mainen ZF, Margrie TW, Rochefort NL, Wikenheiser AM, Carandini M, Coen P. (2024) An adaptable, reusable, and light implant for chronic Neuropixels probes. bioRxiv. DOI: 10.7554/eLife.98522.

Bruijns SA, International Brain Laboratory, Bougrova K, Laranjeira IC, Lau PYP, Meijer GT, Miska NJ, Noel JP, Pan-Vazquez A, Roth N, Socha KZ, Urai AE, Dayan P. (2024) Dissecting the complexities of learning with infinite hidden Markov models. bioRxiv. DOI: 10.1101/2023.12.22.573001.

Cazettes F, Reato D, Augusto E, Renart A, Mainen ZF. (2024) Facial expressions in mice reveal latent cognitive variables and their neural correlates. bioRxiv. DOI: 0.1101/2024.06.02.597005.

Collins EMD, Silva PTM, Ostrovsky AD, Renninger SL, Tomás AR, Diez del Corral R, Orger MB. (2025) Characterisation of transgenic lines labelling reticulospinal neurons in larval zebrafish. bioRxiv. DOI: 10.1101/2024.12.20.629714.

Costa T, Castiñeiras de Saa JR, Renart A. (2024) Optimal control of spiking neural networks. bioRxiv. DOI: 10.1101/2024.10.02.616330.

Cruz BF, Carriço P, Teixeira L, Freitas S, Mendes F, Bento D, Silva A. (2024) A flexible fluid delivery system for rodent behavior experiments. bioRxiv. DOI: 10.1101/2024.04.27.590287.

Ezra G, Henriques SF, Muench D, Francisco AP, Baltazar C, Elias AP, Deplancke B, Ribeiro C. (2024) Lack of single amino acids transcriptionally remodels sensory systems to enhance the intake of protein and microbiota. bioRxiv. DOI: 10.1101/2024.07.23.604616.

Gokcen E, Jasper AI, Kohn A, Machens CK, Yu BM. (2024) Fast multi-group Gaussian process factor models. arXiv. DOI: 10.48550/arXiv.2412.16773.

Goldschmidt D, Guo Y, Chitnis SS, Christoforou C, Turner-Evans D, Ribeiro C, Hermundstad AM, Jayaraman V, Haberkern H. (2024) Exploration and exploitation are flexibly balanced during local search in flies. bioRxiv. DOI: 10.1101/2024.06.26.600764.

Hobbiss AF, Franco MC, Medeiros AM, Rosher C, Mendes CS, Moita MA. (2024) Covert muscle activity reveals dynamic freezing states and prepares escape in Drosophila. bioRxiv. DOI: 10.1101/2024.11.26.622641.

Jouary A, Silva PTM, Laborde A, Mata JM, Marques JC, Collins EMD, Peterson RT, Machens CK, Orger MB. (2024) Megabouts: a flexible pipeline for zebrafish locomotion analysis. bioRxiv. DOI: 0.1101/2024.09.14.613078.

Lagarto JL, Herrando AI, Rego R, Fernández L, Azevedo J, Domingos H, Vieira P, Parvaiz A, Shcheslavskiy VI, Silva PG, Castillo-Martin M. (2024) Identification of colorectal malignancies enabled by phasor-based autofluorescence lifetime macroimaging and ensemble learning. medRxiv. DOI: 10.1101/2024.12.04.24317691.

Mendes RV, Ribeiro JM, Gouveia H, Rebelo de Almeida C, Castillo-Martin M, Brito MJ, Canas-Marques R, Batista E, Alves C, Sousa B, Gouveia P, Godinho Ferreira M, Cardoso MJ, Cardoso F, Fior R. (2024) Zebrafish Avatar-test predicts patient's tumor response to chemotherapy in breast cancer: a co-clinical study towards personalized medicine. bioRxiv. DOI: 10.1101/2024.10.03.616349.

Mustun F, Semenzin C, Rance D, Marachlian E, Guillerm ZL, Mancini A, Bouaziz I, Fleck E, Shashar N, de Polavieja GG, Sumbre G. (2024) Whistle variability and social acoustic interactions in bottlenose dolphins. bioRxiv. DOI: 10.1101/2024.10.15.618471.

Podlaski WF, Machens CK. (2024) Storing overlapping associative memories on latent manifolds in low-rank spiking networks. arXiv. DOI: 10.48550/arXiv.2411.17485.

Sahu P, Canato S, Soares R, Sánchez-Danés A, Hannezo E. (2024) Biomechanics of stem cell fate decisions in multilayered tissues. bioRxiv. DOI: 10.1101/2024.12.12.628138.

Silva NT, Ribeiro MI, Carey MR. (2024) Behavioral state regulates the dynamics of memory consolidation. bioRxiv. DOI: 10.1101/2024.06.28.601231.

Spinazzola A, Carvalho T, Ferreira Pinto MA, Marques-Reis M, Gutiérrez-García A, Accardi D, Moreno E. (2024) Heterotypic competition between cancer cells and hepatocytes generates heterogeneous context-dependent phenotypes. bioRxiv. DOI: 10.1101/2024.05.15.593526.

Thomas K, Gibbs F, Marques HG, Carey MR, Sober SJ. (2024) Motor unit mechanisms of speed control in mouse locomotion. bioRxiv. DOI: 10.1101/2024.12.29.628022.

— Protocols and Guidelines

Groheux D, Vaz SC, Ulaner GA, Cook GJR, Woll JPP, Mann RM, Poortmans P, Cardoso F, Jacene H, Graff SL, Rubio IT, Vrancken Peeters MJ, Dibble EH, de Geus-Oei LF. (2024) Joint EANM-SNMMI guidelines on the role of 2-[18F]FDG PET/CT in no special type breast cancer: differences and agreements with European and American guidelines. European Journal of Nuclear Medicine and Molecular Imaging. DOI: 10.1007/s00259-024-06694-x.

Mankoff D, Balogová S, Dunnwald L, Dehdashti F, DeVries E, Evangelista L, Van Kruchten M, Vaz SC, Fowler A, Linden H, Ulaner GA. (2024) Summary: SNMMI Procedure Standard/EANM Practice Guideline for Estrogen Receptor Imaging of Patients with Breast Cancer Using 16α-[18F]Fluoro-17β-Estradiol PET. Journal of Nuclear Medicine. DOI: 10.2967/jnumed.123.266938.

Pais ML, Crisóstomo J, Abrunhosa A, Castelo-Branco M. (2024) Portuguese observational cross-sectional clinical imaging study protocol to investigate central dopaminergic mechanisms of successful weight loss through bariatric surgery. BMJ Open. DOI: 10.1136/bmjopen-2023-080702.

Tejani AS, Klontzas ME, Gatti AA, Mongan JT, Moy L, Park SH, Kahn CE Jr; CLAIM 2024 Update Panel. (2024) Checklist for Artificial Intelligence in Medical Imaging (CLAIM): 2024 Update. Radiology: Artificial Intelligence. DOI: 10.1148/ryai.240300.

Vaz SC, Woll JPP, Cardoso F, Groheux D, Cook GJR, Ulaner GA, Jacene H, Rubio IT, Schoones JW, Peeters MV, Poortmans P, Mann RM, Graff SL, Dibble EH, de Geus-Oei LF. (2024) Joint EANM-SNMMI guideline on the role of 2-[18F]FDG PET/CT in no special type breast cancer (endorsed by the ACR, ESSO, ESTRO, EUSOBI/ESR, and EUSOMA). European Journal of Nuclear Medicine and Molecular Imaging. DOI: 10.1007/s00259-024-06696-9.

— Editorials, Comments and Replies

Coelho PD, Mendonça MD. (2024) Learning to have a long-duration response. Movement Disorders. DOI: 10.1002/mds.29743.

Gouveia A, Martins F, Trindade P, Jesus G, Bessa JM, Heitor MJ, Câmara Pestana L, Fernandes LA, Morgado P, Oliveira-Maia AJ. (2024) Neuroscience-based nomenclature for psychotropic drugs: Four reasons to use and keep it in Portugal. Acta Médica Portuguesa. DOI: 10.20344/amp.20267.

Mendonça MD, Ferreira PC, da Silva JA. (2024) Ipsilateral association between rest tremor and striatal binding is likely spurious. Movement Disorders. DOI: 10.1002/mds.30099.

Oliveira-Maia AJ, Seybert C. (2025) Dilemmas in psychedelic medicine: From ethics to regulation and equity. European Neuropsychopharmacology. DOI: 10.1016/j.euroneuro.2024.11.003.

— Case Reports

Mendonça MD, Barahona-Corrêa JB. (2024) Tetrabenazine-induced acute dystonic reaction during the treatment of comorbid tics in a young woman with autism spectrum disorder. Psychiatry and Clinical Neurosciences. DOI: 10.1111/pcn.13705.

— Books / Book chapters

Monteiro J, Martins S, Almeida R, Cabrera C, Certal AC. (2024) Dietary requirements for zebrafish. In: Zebrafish: A Practical Guide to Husbandry, Welfare and Research Methodology. CABI. DOI: 10.1079/9781800629431.0003.

Sandru AR, Gonzalez Luna Ortiz F, Mainen ZF, editors. (2024) Towards a dialogue between object-oriented ontology and science. Open Philosophy. Volume 7, Issue 1. URL: https://www.degruyter.com/journal/key/opphil/7/1/html.

Theses

PhD

— January

Julia Elzanowska
Extracellular Vesicles Molecular Cargo as Cancer Biomarkers: Insights into EV-DNA Preparation and EV Protein Interactions
Supervisor: Bruno Costa-Silva

— February

Filipe Rodrigues
The basal ganglia learn a temporal basis for the organization of behavior
Supervisor: Joe Paton

— March

Gonçalo Guiomar
Parallel loops of behavioural control by opponent striatal circuits
Supervisors: Christian Machens, Daniel McNamee, Joe Paton

Juan Castiñeiras
Mechanisms and norms of perceptual choice. Bounded accumulation of evidence in decision making and optimal stochastic intermittent control
Supervisor: Alfonso Renart

— April

Ana Gonçalves
Purkinje cell complex spikes in locomotor coordination and learning
Supervisor: Megan Carey

— May

Jaime Caballero
Neuroimaging study of the effects of transcranial static-magnetic-field stimulation on corticostriatal activity
Supervisors: Guglielmo Foffani, José Ángel Pineda Pardo
(Centro Integral de Neurociencias Abarca-Campal, HM CINAC)

— June

Rita Gil
Unravelling spatiotemporal mechanisms of rodent visual function via advanced magnetic resonance imaging. From illusion encoding to new contrast mechanisms
Supervisor: Noam Shemesh

Oihane Horno
Neural population dynamics across hierarchically organised visual areas of the mouse
Supervisors: Susana Lima, Leopoldo Petreanu, Christian Machens

— July

Davide Crombie
Contextual modulation of stimulus processing in the mouse visual thalamus
Supervisors: Laura Busse (LMU Munich), Christian Leibold (Freiburg University)

Mauricio Toro
Context dependent expectation signals in behavior and brain
Supervisor: Joe Paton

— September

Andreia Maia
The potential of natural killer cells in pancreatic cancer: from exploring tumor-infiltrating lymphocytes to novel CAR-NK cell therapy
Supervisor: Luis Miguel Borrego (NOVA Medical School)

— October

Matheus Farias
On the mechanisms by which descending neurons control defensive behaviors in fruit flies
Supervisor: Marta Moita

Miguel Rendas
Control of innate lymphoid cells by circadian cues
Supervisor: Henrique Veiga-Fernandes

— November

Leonor Peixoto
Unknown pathways of intertumoral – cancer and its microenvironment – and intratumoral – between cancer cells – cell fitness comparisons
Supervisors: Eduardo Moreno, Arsénio Fialho, Rajan Gogna

Miguel Pinto
Uncovering novel mechanical cell competition regulators: the role of the cell adhesion molecules Roughest and Hibris in crowding-induced cell competition
Supervisor: Eduardo Moreno

Solène Sautory
Evolution of serotonin responses to visual stimuli: novelty, familiarity and learned salience
Supervisors: Zachary Mainen, Leopoldo Petreanu

Margarida Sousa
Signatures and consequences of distributional reinforcement learning
Supervisors: Joe Paton, Daniel McNamee

— December

Diogo Duarte
Cerebellar population activity d uring mouse locomotion
Supervisor: Megan Carey

Kristin Fischer
The enteric immune landscape in response to high-fat high-sugar diet
Supervisor: Henrique Veiga-Fernandes

Ana Rita Mendes
Spinal control of sexual excitation and copulatory behavior. Evidence for a group of galanin-positive cells in the lumbar spinal cord controlling sexual behaviour in male mice
Supervisor: Susana Lima

MSc

— May

Adriana Raileanu
Monte Carlo simulation of SPECT images for assessment of 90-Y microspheres distribution after liver radioembolization
Supervisors: Paulo Ferreira, João Cruz (NOVA School of Science and Technology)

— April

Cláudia Carvalho
Non-viral mRNA therapy for inherited retinal diseases
Supervisor: Miguel Seabra

— June

Marta Jacques
Comparison of 18F-FDG, 18F-florbetapir and 18F-flortaucipir PET images to predict the conversion of mild cognitive impairment to dementia
Supervisors: Francisco Oliveira, Alexandre Andrade (Faculty of Sciences, University of Lisbon)

— July

Maria Madalena Ramos Pereira
VIP Neuroepithelial Circuit in Immunity and Metabolism
Supervisors: Henrique Veiga-Fernandes, António Duarte (Faculdade de Medicina Veterinária, Universidade de Lisboa)

Ana Rocha
Impulsive-compulsive behaviors in older adults: rethinking our approach to clinical assessment considering the related harm
Supervisors: Eleonora Fiorenzato (Università degli Studi di Padova), Nicky Edelstyn (Keele University)

André Abreu
The Shame Multidimensional Inventory: construction and metrological study of a new self-report assessment i nstrument for clinical use
Supervisor: Maria João Afonso (Faculdade de Psicologia da Universidade de Lisboa)

— September

João Sena Ribeiros
Investigating a neuronal circuit to translate sensory information i nto decision-making in an exploration exploitation trade-off task
Supervisor: Carlos Ribeiro

Cleusia Manuel
Neural regulation of fly's cardiac activity during defensive behaviours
Supervisor: Natalia Barrios, Marta Moita, Rita Teodoro (NOVA Medical School)

David Pereira
Neuronal dynamics underlying stimulus selection for zebrafish orienting behaviour
Supervisors: Sabine Renninger, Alexandre Andrade (University of Lisbon)

— October

Maria Trindade Santos
Dual-Imaging radiocomplexes for prostate cancer
Supervisors: Francisco Silva, Célia Maria da Cruz Fernandes (Instituto Superior Técnico), Helena Luísa de Araújo Vieira (NOVA School of Science and Technology)

Margarida Gingeira
The effects of Purkinje cell ablation on cerebellar de novo and cross-modal transfer learning
Supervisor: Megan Carey, João António Nave Laranjinha (University of Coimbra)

Shuvajit Rakshit
Testing new NRF2 activators in an AMD mouse model
Supervisor: Miguel Seabra

— November

Sara Cardoso
Unveiling an alternative mechanism of action for bevacizumab therapy using breast cancer zebrafish xenografts
Supervisors: Rita Fior, Ana Rita Grosso (NOVA School of Science and Technology)

Marta Amaro
Computational biology and machine learning approaches to dissect gene expression changes in the immune system during the formation of breast cancer metastases
Supervisors: Ana Luisa Correia, Emanuel Gonçalves (INESC-ID, Instituto Superior Técnico)

Gonçalo Oliveira
Predicting zebrafish behavior and internal states using computational models
Supervisors: Adrien Jouary, Arlindo Oliveira (Instituto Superior Técnico)

— December

Matilde Gaiolas
Striatal and extra-striatal structural changes associated with rest tremor in Parkinson's disease
Supervisors: Marcelo Mendonça, Ricardo Vigário (FCT-UNL)

Maria Iláco Pacheco
Accurate segmentation of brain regions of interest in [18F]FDG PET imaging using convolutional neural networks to improve quantitative assessment
Supervisors: Francisco Oliveira, José Manuel Fonseca (NOVA School of Science and Technology)

Salvador Ferreira
Zebrafish avatars to forecast hormone therapy response in breast cancer
Supervisors: Raquel Mendes, Rita Fior

Catarina Matos
Larval zebrafish's sophisticated short-term memory shares key features of working memory with mammals
Supervisors: João Marques, Clara Amorim (University of Lisbon)

Maria Inês de Araújo Queiroz Vieira
Neural systems that process visual self-motion cues in larval fish: a comparative approach
Supervisors: Michael Orger, Luís Humberto Viseu Melo (Instituto Superior Técnico)

External Funding

The list below includes external competitive funds that were awarded during 2024, as well as external competitive funds that were awarded previously and were actively running at the CCU during 2024.

— Institutional Projects

European Commission – Horizon 2020

Leveraging the unique organismic approach to health and disease of the Champalimaud Foundation through the inception of a quantitative biomedicine research programme focused on cancer
Call/Programme: H2020-WIDESPREAD-2016-2017
Active period: 01/10/18-31/03/24

Comissão de Coordenação e Desenvolvimento Regional de Lisboa e Vale do Tejo

Science at the service of clinical practice for the wellbeing of society in times of pandemic: investigating the unknown today to better serve the population in the uncertainty of tomorrow (Test@CF)
Call/Programme: Aviso N.º 02/SAICT/2020 (SAICT-D2-2020-02)
Active period: 01/07/20-31/03/24

Foundation for Science and Technology (FCT)

Champalimaud Research Programme
Call/Programme: 2017/2018 R&D Unit evaluation
Active period: 01/01/20-31/12/24

— Research Projects/Grants

Associação Portuguesa Contra a Leucemia (APCL)

Cristina João
High-throughput personalized drug screening for multiple myeloma using 3D ex vivo model
Call/Programme: 6.ª edição da Bolsa de Investigação em Mieloma Múltiplo
Active period: 01/01/25-31/12/25

Beug Foundation

Ana Luísa Correia
Harnessing neuron-NK cell interactions to prevent metastasis
Call/Programme: Metastasis Prize
Active period: 2022-2027

BIAL Foundation

Rita Fior
Zebrafish avatars, towards personalized cancer treatment, a multidisciplinary venture
Call/Programme: Prémio Bial de Medicina Clínica Menção Honrosa
Active period: 01/05/21-30/04/24

Jaime Gracio
(Oliveira-Maia lab)
Other CF researchers involved: Marta Moita
Assessing cardiac activity as a predictor of freezing behaviour in humans. A translational approach
Call/Programme: Programme of grants for scientific research 2022/2023
Active period: 01/03/23-28/02/26

Brain & Behavior Research Foundation (BBRF)

Gonçalo Cotovio
(Oliveira-Maia lab)
Improving obsessive-compulsive disorder treatments: from lesions to neuromodulation targets
Call/Programme: Young Investigator Grants
Active period: 01/01/24-31/12/25

Campus Neurológico Sénior (CNS)

Ruxanda Lungu
(Shemesh Lab)
Disfunções sensoriais na doença de Parkinson: mapeamento da atividade neuronal
Call/Programme: Prémio CNS

Cancer Research Institute (CRI)

Rita Fior
A new discovery platform to find innate immune modulators for cancer immunotherapy
Call/Programme: CRI Technology Impact Award
Active period: 01/09/23-31/08/24

Chan Zuckerberg Initiative (CZI)

Carlos Ribeiro
Mapping fatty acid synthesis in an entire organism, in space and time
Call/Programme: Measuring Metabolism Across Scales
Active period: 01/12/23-30/11/25

Choroideremia Research Foundation (CRF)

Luísa Lemos
(Seabra lab)
Pathways of retinal pigment epithelium degeneration in choroideremia
Call/Programme: Randy Wheelock Award
Active period: 01/01/24-31/12/24

Miguel Seabra
CRISPR-based gene editing for choroideremia
Call/Programme: Throssell and Hillier Families Research Award
Active period: 01/01/23-30/06/24

European Commission (EC)

Eva Batista
(Fátima Cardoso, Unidade de Mama, CCC)
Coordination: Universitair Medisch Centrum Utrecht
ARTificial InteLLigence for EaRlY detection of non-communicable disease risk in people with breast cancer (ARTILLERY)
Call/Programme: HORIZON-HLTH-2022-STAYHLTH-01-04-two-stage
Active period: 01/05/23-30/04/28

Megan Carey
Cerebellar circuits for locomotor learning in space and time (LOCOLEARN)
Call/Programme: ERC 2019-CoG
Active period: 01/05/20-30/04/25

Eugenia Chiappe
Neural circuits for error correction (ECoFly)
Call/Programme: ERC-2022-CoG
Active period: 01/01/24-31/12/29

Rita Fior
Enhancing non-communicable disease research excellence through zebrafish capacity (ZeNCure)
Call/Programme: HORIZON-WIDERA-2023-ACCESS-02-01
Active period: 01/10/23-30/09/26

Andrada Ianus
(Shemesh lab)
Revealing liver micrometastases in vivo using ultra-high definition MRI (MicroMetSCAN)
Call/Programme: ERC-2024-StG

Susana Lima
Hypothalamic circuits for the selection of defensive and mating behaviour in females
Call/Programme: ERC-2017-COG
Active period: 01/03/18-28/02/24

Carlos Minutti
Conventional Dendritic Cells – ecology, diversity, and Function (cDCFun)
Call/Programme: ERC Starting Grant 2023
Active period: 01/01/24-31/12/28

Marta Moita
Actively FROzen – contextual modulation of freezing and its neuronal basis (A-FRO)
Call/Programme: ERC-2018-CoG
Active period: 2019-2024

Albino Oliveira-Maia
Coordination: Waterford Institute of Technology (WIT)
Federated Artificial Intelligence solution for monitoring mental health status after cancer treatment
Call/Programme: H2020-SC1-DTH-2019
Active period: 01/01/20-30/06/24

Albino Oliveira-Maia
Reinforcement learning from postingestive calories: from body to brain in health and disease (CalorieRL)
Call/Programme: ERC-2020-STG
Active period: 01/11/20-31/10/25

Albino Oliveira-Maia
Coordination: UMC Groningen
Psilocybin therapy for psychological distress in palliative care patients (PsyPal)
Call/Programme: HORIZON-HLTH-2023-DISEASE-03-01
Active period: 01/01/24-31/12/27

Albino Oliveira-Maia
Modulating feeding behavior: from brain lesions to non-invasive brain stimulation targets (FoodConnect)
Call/Programme: ERC Proof of Concept 2023
Active period: 19/06/24-18/12/25

Michael Orger
Coordination: Institut du Cerveau et de la Moëlle Épinière – ICM
ZEbrafish Neuroscience Interdisciplinary Training Hub (ZENITH)
Call/Programme: H2020-MSCA-ITN-2018
Active period: 01/10/19-31/03/24

Nickolas Papanikolaou
Coordination: IDRYMA Technologias Kai Erevnas – Foundation for Research and Technology Hellas
An AI Platform integrating imaging data and models, supporting precision care through prostate cancer's continuum – 'ProCAncer-I'
Call/Programme: H2020-SC1-FA-DTS-2019-1
Active period: 10/10/20-30/09/24

Nickolas Papanikolaou
EUropean Federation for CAncer IMages (EUCAIM)
Call/Programme: DIGITAL-2022-CLOUD-AI-02-CANCER-IMAGE
Active period: 01/01/23-31/12/26

Joe Paton
Basal ganglia circuit mechanisms underlying dynamic cognitive behavior
Call/Programme: ERC-2017-COG
Active period: 01/04/18-30/09/24

Gonzalo de Polavieja
Coordination: Proyetos Y Sistemas de Mantenimiento SL – EPROSIMA EPROS
ALMA: Human Centric Algebraic Machine Learning – 'ALMA'
Call/Programme: H2020-EIC-FETPROACT-2019
Active period: 01/09/20-31/08/24

Gonzalo de Polavieja
Coordination: University of Copenhagen (UCPH)
Unified computational solutions to disentangle biological interactions in multi-omics data (FindingPheno)
Call/Programme: Horizon 2020 – Multi-omics for genotype-phenotype associations (BIOTEC-07-2020)
Active period: 01/03/21-28/02/25

Pedro Garcia da Silva
Coordination: Leiden University Medical Center
Active monitoring of cancer as an alternative to surgery
Call/Programme: H2020-MSCA-ITN-2019
Active period: 01/11/19-31/10/24

Henrique Veiga-Fernandes
Understanding Gene ENvironment Interaction in ALcohol-related hepatocellular carcinoma (GENIAL)
Call/Programme: HORIZON-MISS-2021-CANCER-02-03
Active period: 01/01/23-31/12/27

Henrique Veiga-Fernandes
Architecture of peripheral neuroimmune circuits and synapses (NeurImmKisses)
Call/Programme: ERC-AdG-2022
Active period: 01/01/24-31/12/28

European Hematology Association (EHA)

Carlos Minutti
A nutrition-immunity axis mediating conventional dendritic cell development in the bone marrow
Call/Programme: Kick-off Grant
Active period: 01/01/25-31/12/25

European Molecular Biology Organization (EMBO)

Ana Luisa Correia
Tissue-specific immune regulation of disseminated tumor cell dormancy
Call/Programme: EMBO Installation Grants
Active period: 01/01/23-31/12/25

Fight Kids Cancer

Adriana Sánchez-Danés
Establishment of the first preclinical genetic mouse models of Group 4 Medulloblastoma (FIGHT4MB)
Call/Programme: Fight Kids Cancer 2023–2024 Call for Proposals
Active period: 01/01/25-31/12/28

Fondation Bordeaux Université

Christian Machens
Fonds Cajal advanced neuroscience training programme
Active period: 01/01/24-31/12/24

Fundação AstraZeneca (FAZ)

Adriana Sánchez-Danés
Unveiling brain plasticity during pediatric cancer development (BALANCE)
Call/Programme: Premio FAZ Ciencia
Active period: 15/04/23-14/04/26

Foundation for Science and Technology (FCT)

Filipa Barros
(da Silva lab)
Striatal activity and synaptic features underlying dystonic muscle contraction
Call/Programme: R&D Projects in All Scientific Domains – PeX
Active period: 06/03/23-05/09/24

Catarina Brás
(Moreno lab)
The role of healthy cells on the elimination of premalignant cells (DangerCellDeath)
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

David Brea-López
(Veiga-Fernandes lab)
RegulATIon Of iNtestinAL ImmuniTy by braIn-derivEd Signals (RATIONALITIES)
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

Joana Carvalho
(Shemesh lab)
Dissecting brain activity in neurodevelopmental and neurodegenerative disorders across multiple spatiotemporal scales (BOLDissect)
Call/Programme: R&D Projects in All Scientific Domains – PeX
Active period: 01/03/23-31/08/24

Ana Luisa Correia
Restoring tissue physiology to prevent metastatic disease (MetZero)
Call/Programme: ERC-Portugal
Active period: 01/09/23-31/08/26

Bruno Costa-Silva
Coordination: NOVA.ID.FCT
Innovative approaches for pancreatic cancer: decoding and manipulating immune response to short sialylated O-glycans (InnO-Glyco)
Call/Programme: R&D Projects in All Scientific Domains – SR&TD
Active period: 01/03/23-28/02/26

Claudia Feierstein
Dissecting the contribution of neurotransmitter systems to neural dynamics in oculomotor circuits
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 17/02/25-16/08/26

Ana Fernandes
(Oliveira-Maia lab)
Call/Programme: Norma Transitória BPD
Active period: 01/01/19-31/12/24

Ana Fernandes
(Oliveira-Maia lab)
Viscerosensorial pathways in nutrient postingestive signalling (NUTRISENSE)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Bruna Velosa Ferreira
(João lab)
Other CF researchers involved: António Lopez Beltran
Integration of neuronal signals by tumour-infiltrating natural killer and myeloma cells
Call/Programme: R&D Projects in All Scientific Domains – PeX
Active period: 01/02/23-31/07/24

Rita Fior
Dissect the tumor microenvironment to battle cancer radioresistance and immune escape (RADIORESISTANCE)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Rita Fior
Ovarian cancer avatars for personalized therapy, a combination of in vivo & ex-vivo models to guarantee a test for every patient (Z&CTSAvatars)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Cristina Godinho-Silva
(Veiga-Fernandes lab)
Circadian regulation of pulmonary immunity by neuroendocrine signals (CircImmuneReg)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Andrada Ianus
(Shemesh lab)
To wait or to operate after neoadjuvant therapy in locally-advanced rectal cancer: magnetic resonance imaging can provide the answer
Call/Programme: RESTART
Active period: 23/12/23-22/06/25

Andrada Ianus
(Shemesh lab)
Integrative decision making in rectal cancer care: advanced imaging, predictive models, and patient
Call/Programme: THCS

Cristina João
Combined immUNotherapeutIC approach for targeting bone marrow microenvironment in Multiple Myeloma (Unic.MM)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

João Lagarto
Label-free optical imaging for improved margin assessment in Mohs surgery
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 01/02/25-31/07/26

Alexandre Leitão
(Moita lab)
Brain connectivity in a genetically diverse context
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 20/02/25-19/08/26

Raquel Lemos
(Oliveira-Maia lab)
Cognitive motor interference to predict postoperative delirium
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 01/02/25-31/07/26

Maria Martínez Lopez
(Veiga-Fernandes lab)
Commensal microbiota regulation of neuro-immune networks (NEUMIC)
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

João Marques
(Mainen lab)
How working memory guides decisions in zebrafish larvae
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 01/01/24-30/06/26

Nicolas Morgenstern
(Costa lab)
Call/Programme: Norma Transitória BPD
Active period: 01/01/19-31/12/24

Michael Orger
Neural circuits mediating behavioral consequences of social isolation
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 20/02/25-19/08/26

Leopoldo Petreanu
Hierarchical looped interactions in cortical processing (CORTICALOOP)
Call/Programme: SR&TD Project Grants
Active period: 29/03/21-28/03/24

Roksana Pirzgalska
(Veiga-Fernandes lab)
A brain-gut circuit responsible for intestinal immunity and physiology
(Brain2Gut)
Call/Programme: SR&TD Project Grants
Active period: 15/03/21-14/03/24

Gonzalo de Polavieja
Searching for the principles of collective motions and collective decisions: a new generation of experiments and models based on interpretable AI
(Collective.ai)
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

Inês Ramos
(van Gisbergen lab)
Illuminating the role of inhibitory receptors on cancer associated fibroblasts through optogenetics
Call/Programme: Projetos Exploratórios em todos os Domínios Científicos
Active period: 01/02/25-31/07/26

Alfonso Renart
The neural basis of Weber's Law
(WeberNeural)
Call/Programme: FCT 2021 SR&TD
Active period: 17/01/22-16/01/25

Christa Rhiner
Unravelling local and systemic communication promoting brain repair and homeostasis
(BrainSySTEMic)
Call/Programme: ERC-Portugal
Active period: 07/02/24-06/02/27

Carlos Ribeiro
Characterizing neural circuits controlling exploration-exploitation tradeoffs in nutrient foraging decisions
(ExploreExploit)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Adriana Sánchez-Danés
Uncovering the mechanisms of resistance to cancer formation in the developing brain
Call/Programme: R&D Projects in All Scientific Domains – SR&TD
Active period: 01/03/23-28/02/26

Joaquim Alves da Silva
Disentangling cued from self-paced actions in corticostriatal circuits
Call/Programme: Individual Call to Scientific Employment Stimulus 3rd Edition – Junior Researcher
Active period: 01/09/21-31/08/27

Joaquim Alves da Silva
Reinforcement learning from post-ingestive rewards (RePi)
Call/Programme: FCT 2021 SR&TD
Active period: 01/01/22-31/12/24

Maria Luísa Vasconcelos
Neuronal circuits underlying egg laying behavior in the fruit fly
(Neuregglay)
Call/Programme: FCT 2021SR&TD
Active period: 01/01/22-31/12/24

Henrique Veiga-Fernandes
Deciphering pulmonary neuroimmune circuits in health and disease
(NeurImm KISS)
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

IAPMEI – Agência para a Competitividade e Inovação

Joe Paton
(Digital Therapeutics Programme)
Center for Responsible AI
Call/Programme: PRR | Agendas/ Alianças mobilizadoras para a Inovação Empresarial
Active period: 12/04/22-31/12/25

la Caixa Foundation

Ana Luisa Correia
Spatiotemporal dynamics of organ-specific microenvironments in breast cancer metastasis
Call/Programme: CaixaResearch Health
Active period: 01/12/24-30/11/27

Leopoldo Petreanu
Circuit mechanisms for associating high-order cortical activity with expected sensory representations in health and disease
(UPDOWNBOUND)
Call/Programme: Health Research 2022 Call
Active period: 31/12/22-30/12/25

Alfonso Renart
Weber's Law:
A mechanistic window into sensory dysfunction in autism spectrum disorders
Call/Programme: Health Research 2023
Active period: 31/12/23-30/12/26

Christa Rhiner
Unravelling pro-regenerative signaling modules in the injured brain
Call/Programme: Health Research 2023
Active period: 01/12/23-30/11/26

Carlos Ribeiro
From metabolic space to neuronal space: mapping how nutrients affect brain function and behavior
(BrainMetaboSpace)
Call/Programme: Health Research 2023
Active period: 31/12/23-30/12/26

Liga Portuguesa Contra o Cancro – Núcleo Regional do Sul (LPCC-NRS)

Rita Fior
zAvatar test-guided therapeutic decision vs standard of care – a phase II multicentric randomized clinical trial, in relapsed ovarian cancer and in metastatic breast cancer
Call/Programme: Bolsas de Investigação em Oncologia – LPCC-NRS/Terry Fox
Active period: 14/04/23-13/04/25

Adriana Sánchez-Danés
Development of the first preclinical model of the most common paediatric brain cancer
(ModelCANCER)
Call/Programme: Bolsa Investigação em Oncologia
Active period: 12/04/24-11/04/26

The Michael J. Fox Foundation for Parkinson's Research (MJFF)

Joe Paton
Differential targeting of molecularly identified striatal neurons as a therapeutic strategy for minimizing non-motor side effects of dopamine replacement
Call/Programme: Circuits and Cellular Targets for Parkinson's Symptoms – Preclinical studies
Active period: 01/09/23-31/08/25

National Institutes of Health (NIH)

Christian Machens
Understanding feedforward and feedback signaling between neuronal populations
Call/Programme: BRAIN Initiative: Targeted BRAIN Circuits Projects - TargetedBCP (RFA-NS-21-013)
Active period: 15/03/22-28/02/25

Memming Park
Coordination: Princeton University
Adaptive statistical algorithms for learning and control of neural dynamics
Call/Programme: BRAIN Initiative: Theories, Models and Methods for Analysis of Complex Data from the Brain (R01 Clinical Trial Not Allowed)
Active period: 15/09/22-15/09/25

Santa Casa da Misericórdia de Lisboa

Noam Shemesh
From genetic output to brain-wide network function: bridging the gap in Parkinson's disease
Call/Programme: Prémio Mantero Belard
Active period: 2021-2024

Simons Foundation

Christian Machens
Coordination: University of Pittsburgh
Communication between neural populations: circuits, coding, and behavior
Call/Programme: Simons Collaboration on the Global Brain Culmination Awards
Active period: 01/09/23-31/08/25

Christian Machens
Cajal advanced neuroscience training courses
Call/Programme: Neuroscience Collaborations – Conferences and Courses Awards
Active period: 01/09/24-31/08/27

Christian Machens
Supplemental grant
Call/Programme: Supplemental Grants – Group Meetings
Active period: 01/09/24-31/12/24

Zachary Mainen
International Brain Laboratory
Call/Programme: Simons Collaboration on the Global Brain International Brain Laboratory Award
Active period: 01/08/23-31/07/25

Samuel Sober
(Emory University)
and Megan Carey
Coordination: Emory University
Simons-Emory International Consortium on Motor Control
Call/Programme: Chief Scientist Fund-Targeted
Active period: 01/03/20-28/02/24

University College London/ Wellcome Trust

Zachary Mainen
International Brain Laboratory
Call/Programme: Strategic Support – Science application
Active period: 01/04/20-31/03/25

VolkswagenStiftung

Michael Orger
How spontaneous behaviour emerges from brain-wide neural network dynamics
Call/Programme: VWS-VolkswagenStiftung (Life)
Active period: 01/01/19-31/07/25

ZonMw – the Netherlands Organisation for Health Research and Development

Klaas van Gisbergen
Immunological memory of the tissues: how the tumor microenvironment shapes T-cell responses
Call/Programme: NWO Talent Programme Vici 2021
Active period: 08/11/23-03/03/27

— Individual Funding and Fellowships

BIAL Foundation

Ana Rita Cruz
(Costa-Silva lab)
Extracellular vesicles binding to IFNγ as regulators of IFNγ signaling and antitumor immunity
Call/Programme: Prémio Maria de Sousa
Active period: 01/02/23-31/01/25

Dystonia Medical Research Foundation (DMRF)

Filipa Barros
(da Silva lab)
The role of basal ganglia pathways engaged in skilled forelimb movement in a mouse model of DYT1 dystonia
Call/Programme: Postdoctoral Fellowships
Active period: 15/03/23-14/03/25

European Commission – Marie Skłodowska-Curie Actions (MSCA)

Joana Carvalho
(Shemesh lab)
Multi-dimensional mapping of the interplay between stability and plasticity in the adult visual pathway
(PlastiMap)
Call/Programme: H2020 MSCA Individual fellowships
Active period: 01/10/21-12/01/24

Jonathan Cook
(Lima lab)
Neural mechanism underlying the central regulation of male sexual arousal and ejaculation (MPOA)
Call/Programme: H2020 MSCA Individual fellowships
Active period: 01/09/22-31/08/24

Ana Rita Cruz
(Costa-Silva lab)
Evasion of antitumor immunity and immunotherapy by melanoma extracellular vesicles (Evasion)
Call/Programme: MSCA Postdoctoral Fellowships
Active period: 01/06/23-31/05/25

Corinna Gebehart
(Chiappe lab)
The role of ascending proprioceptive information in decision-making processes in walking Drosophila
(BottomUpFly)
Call/Programme: MSCA Postdoctoral Fellowships
Active period: 01/09/24-31/08/26

Alice Geminiani
(Carey lab)
Supervised mechanisms for Locomotor learning in the cerebellum (SuperLoco)
Call/Programme: MSCA Postdoctoral Fellowships
Active period: 01/10/24-30/09/26

Gili Ezra Gili
(Ribeiro lab)
How does a need turn to a want: using Drosophila melanogaster to identify how the gut-brain axis mediates protein appetite
(Body2Mind)
Call/Programme: H2020 MSCA Individual fellowships
Active period: 01/09/21-14/02/24

Nuno Machado
(Vasconcelos lab)
Neuronal control of fine movement components of egg laying in fruit fly
(Neuron to Egg Laying)
Call/Programme: MSCA Postdoctoral Fellowships/ERA Fellowships
Active period: 01/09/24-31/08/26

Ana Lúcia Rebelo
(Sanchez-Danes lab)
Uncovering the cell of ORIGIN of Group 4 MedulloBlastoma
(ORIGIN4MB)
Call/Programme: MSCA Postdoctoral Fellowships/ERA Fellowships
Active period: 01/04/24-31/03/24

Claire Rusch
(Chiappe lab)
Sensorimotor Integration, Motor Planning and Learning In FLY (SIMPLIFLY)
Call/Programme: MSCA Postdoctoral Fellowships
Active Period: 01/09/23-31/08/25

European Molecular Biology Organization (EMBO)

Matthjis Oude Lohuis
(Petreanu lab)
Other CF researchers involved: Christian Machens
Communication in the brain: flexible signalling with fixed lines
Call/Programme: Postdoctoral Fellowships
Active period: 15/02/24-14/02/26

Foundation for Science and Technology (FCT)

Cátia Rebelo de Almeida
(Fior lab)
Dissecting a new molecular mechanism underlying bevacizumab mode of action – more than an anti-angiogenic therapy
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/01/22-21/12/25

Jaime Arlandis
(Mainen lab)
State representations and attention to behaviorally relevant information
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/09/21-31/08/25

Filipa Barahona
(João lab)
COntribution of noninvasive biomarkers for Multiple myeloma Prognosis ASSessment (COMPASS)
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/10/21-30/09/25

Filipa Barros
(da Silva lab)
DysCo: cholinergic effects on the striatal control of dystonic muscular contraction
Call/Programme: Individual Call to Scientific Employment Stimulus – Junior Level
Active period: 01/03/23-2/28/29

Beatriz Belbut
(Petreanu lab)
The functional coupling of corticocortical loops during behavior
Call/Programme: 2019 FCT PhD Research Fellowships
Active period: 01/08/20-31/07/24

Naz Belkaya
(Renart lab)
Neural basis of the decision bound in perceptual decision-making
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/08/22-30/09/26

Rory Beresford
(Ribeiro lab)
Identifying the circuit mechanisms mediating nutrient specific feeding changes during reproduction in Drosophila females
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/08/22-30/09/26

Adrianna Bielowka
(Sánchez-Danés lab)
The role of extracellular vesicles in neuroblastoma progression
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/09/23-31/08/27

David Brea-López
(Veiga-Fernandes lab)
Regulation of intestinal immunity by brain-derived signals
Call/Programme: Individual Call to Scientific Employment Stimulus
Active period: 01/06/19-31/05/25

Inês Dias
(Lima lab)
Hypothalamic circuits linking the reproductive cycle to female sexual behavior
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/09/21-31/08/25

Pedro Correia Ferreira
(da Silva lab)
Uncovering the mechanisms of tremor in Parkinson's Disease
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/09/23-31/08/27

Rita Figuereido
(Ribeiro lab)
The effects of tumorigenesis on nutrient cravings: dissecting the role of cellular metabolism in directing specific nutritional appetites to sustain high cell proliferation rates
Call/Programme: 2019 PhD Fellowships
Active period: 2020-2024

Marta Forcella
(Carey lab)
Cerebellar granule cell population activity in the context of sensorimotor behavior
Call/Programme: 2024 FCT PhD Research Fellowships
Active period: 01/09/24-31/08/28

Andreia Gonçalves
(Correia Lab)
Deciphering the role of tissue innervation in metastatic breast cancer dormancy
Call/Programme: 2024 FCT PhD Research Fellowships
Active period: 01/09/24-31/08/28

Mirjam Heinemans
(Moita lab)
Social modulation of defensive behaviours in Drosophila
Call/Programme: 2019 PhD Fellowships
Active period: 2020-2024

Rafael Henriques
(Shemesh lab)
Correlation Tensor MRI: a paradigm shift for stroke imaging
Call/Programme: 2022 FCT PhD Research Fellowships
Active period: 01/10/22-30/09/28

Silvia Henriques
(Ribeiro lab)
Identifying the metabolites that mediate the effect of commensal bacteria on food choice in Drosophila melanogaster
Call/Programme: 2022 FCT PhD Research Fellowships
Active period: 01/07/22-30/06/28

Hyungju Jeon
(Park Lab)
Active learning for real-time neural dynamics inference
Call/Programme: 2024 FCT PhD Research Fellowships
Active period: 01/09/24-31/08/28

Merit Kruse
(Carey lab)
Investigating the role of contextual information in the granule cell layer during cerebellar associative learning
Call/Programme: 2020 FCT PhD Research Fellowships
Active period: 01/08/21-01/08/25

Inês Laranjeira
(Mainen & McNamee labs)
The role of representation learning in inter-individual behavioral and neural variability
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/09/23-31/08/27

Raquel Lemos
(Oliveira-Maia lab)
Cognitive-motor dual-task as a measure of cognitive reserve in patients treated with brain radiotherapy
Call/Programme: CEEC Individual 2018
Active period: 01/08/20-31/07/26

Raquel Lopes
(João lab)
Combined immUNotherapeutIC approach for targeting bone marrow microenvironment in Multiple Myeloma (Unic.MM)
Call/Programme: 2020 FCT PhD Research Fellowships
Active period: 01/01/21-31/12/24

Ana Machado
(Fior lab)
Fishing for new immunotherapy compounds to boost innate-tumor rejection
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/11/21-31/10/25

Ana Maia
(Oliveira-Maia lab)
Immune dysfunction in obsessive-compulsive disorder: from environmental risk factors to clinical and brain imaging correlates
Call/Programme: 2019 PhD Fellowships
Active period: 01/07/20-30/06/24

Ana Sofia Marques
(Sánchez-Danés lab)
Uncovering the similarities and differences in Metastasis formation in Adult and Paediatric skin cancer (MetAP)
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/08/22-30/09/26

Diogo Soares Melo
(Oliveira-Maia lab)
Learning from postingestive feedback to understand food seeking across health and disease
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/08/24-31/07/28

Daniela Pereira
(da Silva lab)
Call/Programme: Individual Call to Scientific Employment Stimulus
Active period: 01/06/19-31/05/25

Roksana Pirzgalska
(Veiga-Fernandes lab)
Neuroimmune control of the intestinal mucosa: from nutrient absorption to immune responses
Call/Programme: CEEC Individual 2018
Active period: 01/08/20-31/07/26

Ana Queirós
(João lab)
Understanding epigenetic mechanisms in haematological disorders
Call/Programme: 2022 FCT PhD Research fellowships
Active period: 01/07/22-30/06/28

Ana Rasteiro
(Veiga-Fernandes lab)
Deciphering pulmonary neuroimmune circuits in health and disease
Call/Programme: 2022 FCT PhD Research Fellowships
Active period: 01/08/23-31/07/27

Pedro Rocha
(McNamee lab)
Neural representations of learning and decision-making in mild cognitive impairment during navigation in naturalistic virtual environments
Call/Programme: 2024 FCT PhD Research Fellowships
Active period: 01/09/24-31/08/28

Charlotte Rosher
(Moita Lab)
The startle response as a reset that facilitates adaptive defensive responses to threat
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/09/23-31/08/27

Solène Sautory
(Mainen & Petreanu labs)
Examining the serotonergic mechanisms involved in shaping predictive sensory processing
Call/Programme: 2021 FCT PhD Research Fellowships
Active period: 01/09/21-31/08/24

Daniel Silva
(Oliveira-Maia lab)
Assessing freezing behavior and its physiological underpinnings in humans: from health to disease
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/07/24-30/06/28

Pedro Silva
(Orger lab)
How a conserved circuit drives distinct locomotor behaviors in two closely related fish
Call/Programme: 2023 FCT PhD Research Fellowships
Active period: 01/09/23-31/08/27

Human Frontier Science Program (HFSP)

Coralie Hérent
(Carey lab)
Cell-specific functional connectivity of cerebellar outputs for locomotor learning
Call/Programme: HFSP Postdoctoral Fellowships
Active period: 01/09/22-31/8/25

Juan Sanchez
(Rhiner lab)
Unraveling the cellular and molecular dynamics of adult neurogenic niches
Call/Programme: HFSP Postdoctoral Fellowships
Active period: 01/05/24-30/04/27

la Caixa Foundation

María Martínez Lopez
(Veiga-Fernandes lab)
Dendritic cells, bridging neuromodulation and immunity
Call/Programme: Junior Leader Fellowships (Retaining)
Active period: 01/11/22-31/10/25

João Marques
(Mainen lab)
Understanding how the brain produces types of movements
Call/Programme: Junior Leader Fellowships (Retaining)
Active period: 31/12/21-30/12/24

NWO – Dutch Research Council

Matthjis Oude Lohuis (Petreanu lab)
Other CF researchers involved: Christian Machens
Communication in the brain: flexible signalling with fixed lines
Call/Programme: NWO Talent Programme – Rubicon 2022-3
Active period: 01/06/23-31/05/25

Schmidt Science Fellows

Bruna Martins Garcia
(Correia lab)
Call/Programme: Schmidt Science Fellows
Active period: 01/07/24-30/06/26

Simons Foundation

Caroline Haimerl
(Paton lab)
Multiarea computations for multiscale behavior
Call/Programme: Simons Collaboration on the Global Brain Transition to Independence Award
Active period: 01/09/24-31/08/26

Francesca Mastrogiuseppe
(Machens lab)
Mechanisms of learning in cortical neural networks
Call/Programme: Simons Collaboration on the Global Brain Transition to Independence Award
Active period: 01/09/23-31/08/25

– Educational and Outreach Projects

Animal Research Tomorrow (ART)

Benjamin Zarov
(Paton lab)
The sound of (neuro)science
Call/Programme: ART Science Communication (SciComm) Grants
Active period: 15/04/24-15/04/25

European Commission

Communication, Events and Outreach team
Researchers in Action for Inclusion in Science and Education (RAISE)
Call/Programme: HORIZON-MSCA-2022-CITIZENS-01
Active period: 01/05/22-30/04/24

Scientific Events

— January

08 Champalimaud Internal Seminar Series (CISS)
Raquel Sequeira | Hasti Calá
Defining the Biological Basis of the Primary-Metastatic Tumour Communication Axis | Champalimaud Foundation Biobank

15 Champalimaud Open Seminar Series (COpS)
Ana Luisa Correia | Zachary Mainen
What Makes a Tissue Favorable or not to Metastasis | Serotonin and the Regulation of Brain States and Behavior

17 Innovation Speaker Series
Tiago P. Carvalho,
Co-CEO & Founder of LabOrders
From Neurons to Euros: Bootstrapping your Venture in Portugal

18 Ad hoc Seminar
Klavdia Zemlianova, NYU
A Recurrent Neural Network for Rhythmic Timing

22 CISS
Filipa Barros
Movement Initiation Reveals a Hyperactive Direct Pathway in a Mouse Model of Dystonia

Workshop
Workshop on Interactive AI Systems for Digital Therapeutics

24 Roundtable
Panel Discussion on AI x Therapeutics
John Krakauer, Kemar Green, Jessica Rosendorf, Nicolai Frost & Alexander Loktyushini

24 Theory Seminar Series
Hans Ekkehard Plesser,
Norwegian University of Life Sciences
Seminar: 70 Years of Spiking Network Simulations: Past, Present, and Perspectives

25 CR Colloquia Series
Miguel Soares, IGC
Why Do We Survive or Die from Infectious Diseases?

29 CISS
Rafaela Timóteo | Joana de Oliveira Carvalho
Extended Reality: Building the Operating Room of the Future | Extensive Topographic Remapping upon First Visual Experience in the Adult Rat Visual Pathway

— February

05 COpS
Susana Lima | Leopoldo Petreanu
Neural Circuits of Mice Sexual Behaviour | How Does the Brain Acquire and Employ Knowledge about the World to Shape Perception?

06 Symposium
I Champalimaud Postdoc Symposium

Theory Seminar Series
Rodolphe Sepulchre, KU Leuven & University of Cambridge
Tutorial: Mixed Feedback Control Theory

07 Theory Seminar Series
Rodolphe Sepulchre
Seminar: To Know or to Predict? 70 Years of Hodgkin-Huxley Modelling in Science and Engineering

08 CR Colloquia Series
Enzo Poirier,
Institut Curie, Paris
Cell-Intrinsic Antiviral Immunity in Undifferentiated Cells

12 Innovation Speaker Series
Susana Frazão, Co-founder of IES-Social Business School
How Venture Philanthropy (Impact Investing) Can Support Healthcare Innovations

15 CR Colloquia Series
João Peça,
University of Coimbra
Regulation of Metabotropic Glutamate Receptors in Inhibitory Parvalbumin Neurons is Critical for Social Behavior and Memory

Ad hoc Seminar
Kyle Cunningham
A Family of Helminth-derived TGF-β mimics Provide Key Insights to Immune Cell Activation

19 CISS
Sara Ferreira | Nuno Rodrigues
Uncovering the Cellular Crosstalks that Drive Neuroblastoma Progression and Metastasis Formation | Using Large Heterogeneous Datasets for Prostate Gland, Zones and Lesion Segmentation

21 Theory Seminar Series
Pablo Sartori,
Instituto Gulbenkian de Ciência
Seminar: Bacterial Chemotaxis as a Model System for Cellular Computations
Tutorial: Remembering Liquids and Navigating Assemblies: the Cellular Cytoplasm as a Neural System

22 CR Colloquia Series
João Filipe Oliveira,
University of Minho
The Involvement of Astrocyte Calcium-Dependent Signaling in Fear Memory

26 CISS
Francesco Trapani | Simon Zamora
Optimal Flexible Inference for Behavior without Generative World Models | Investigating the Respective Contributions of Basal Ganglia and Cerebellum to Motor Control

27 Ad hoc Seminar
Chunyu Ann Duan | Devika Narain
Probing Economic Decision Preferences in Mice | Unsupervised Manifold Learning using Low-Distortion Riemannian Alignment of Tangent Spaces

Hackathon
Pre-COSYNE Brainhack

28 Innovation Speaker Series
Claire Cook, Universal Everything
Beneficial Art and Design for Digital Health

29 CR Colloquia Series
Benjamin Judkewitz, Einstein Center for Neurosciences Berlin
The Smallest Vertebrate Brain Knows How to Sing

— March

04 CISS
Luísa Lemos | Sabine Renninger
mRNA-Based Gene Therapy for Retinal Diseases | Diencephalic Architectures for Visual Orientation

06 Theory Seminar Series
Olivier Hénaff, Google DeepMind
Data-Driven Hypotheses for the Role of Memory in Perception and Learning

07 CR Colloquia Series
Ilana Gabanyi, Instituto Gulbenkian de Ciência
Gut Microbiota Impact on Feeding and Temperature Control

11 CISS
Maria Keridon
Development of Tissue Resident Memory T Cells in Tumours

Symposium
Paediatric Cancer Symposium

18 CISS
Matthijs oude Lohuis
Communication in the Brain: The Anatomy of Interareal Signals

Innovation Speaker Series
Bonnie Clipper, CEO and Founder of Innovation Advantage
Virtual Nursing as a Way to Improve Care

21 CR Colloquia Series
David Sancho, CNIC
Metabolic Control of Myeloid Cell Function

25 CISS
Juan Sánchez | Eric de Sousa
Unraveling the Cellular and Molecular Dynamics of Adult Neurogenic Niches | Let's Talk About Tumor-Infiltrating T-Cells in Pancreatic Cancer

27 Innovation Speaker Series
Benjamin Viaris de Lesegno
Babies, Business, and Breaking Grounds: My Journey from Ob-Gyn to Entrepreneur

28 Ad hoc Seminar
Inês Félix, University of Turku
The Ontogeny of Adipose Tissue Resident Macrophages

CR Colloquia Series
Mehrdad Jazayeri, MIT
Vector Production via Mental Navigation in the Entorhinal Cortex

— April

03 Theory Seminar Series
Carlos Stein Brito
Closed Loop Approaches for Probing Neural Representations of Learned Tasks

04 CR Colloquia Series
Michael Yartsev, University of California, Berkeley
Neural Representations Across Time and Space in the Hippocampus of Freely Flying Bats

08 COpS
Klaas van Gisbergen
Immunological Memory of the Tissues

10 Conference
1st Portuguese Conference of Brain Stimulation in Mental Health

Theory Seminar Series
Susanne Schreiber,
Humboldt University, Berlin
Seminar: Cellular Action Potential Generation: A Key Player in Setting the Network State
Tutorial: Topology of Cellular Excitability

11–12 Conference
6th European Conference of Brain Stimulation in Mental Health

15 CISS
Caroline Haimerl
Representational Drift Without Synaptic Plasticity

15–19 Course
Principles of Light Microscopy

17 Ad hoc Seminar
Mu-ming Poo, Shanghai Center for Brain Science and Brain-Inspired Technology
Macaque Models for Brain Disorders

Innovation Speaker Series
João Seixas,
Co-founder and CEO of TargTex
An Innovative Localised Delivery Therapy to Treat Glioblastoma Patients

17–18 Symposium
IoN Neuro Symposium

18 CR Colloquia Series
Zoe Donaldson, University of Colorado, Boulder | Devanand Manoli, UCSF
Transcriptional Bases of Long-Term Bonds | Modular Control of Social Attachment Behaviors

22 CISS
Raquel Lopes
Identification of Novel Immunotherapeutic Targets for Multiple Myeloma Based on Single Cell RNA Sequencing

22–23 Workshop
Addressing Data Challenges for Next-Gen Digital Therapeutics Development

23 Ad hoc Seminar
Dimitar Kostadinov, King's College London | Martha Streng, University of Minnesota
Identifying Cell Types Across Species from High-Density Extracellular Recordings | Cerebellar Network Dynamics in Health and Epilepsy

23–24 Annual Meeting
EU Project – GENIAL 2024

24–26 Course
Tumor Infiltrating Lymphocytes (TIL) and Advanced Therapy Medicinal Products (ATMPs)

29 CISS
Jaime Arlandis | Nuno Rito
Psychedelics, Hypnosis, and Aesthetics: On How Images Can Create Experiences | Heading Somewhere? The Role of Head-Body Coordination in Pursuit Behaviors

— May

02 CR Colloquia Series
Paola Bonfanti,
The Francis Crick Institute
Stemness Within an Involuting Organ: Implications for Thymus Regeneration

06 COpS
Miguel Seabra | Pedro Gouveia
Low Cost Ocular Gene Therapy: Bridging Technology With Public Health | An Unexpected Immersive Breast Cancer Journey

06–10 Course
Hands-On Zebrafish Xenografts

07 Ad hoc Seminar
Kevin Mitchell,
Trinity College, Dublin
The Genomic Code: How Organismal Nature is Encoded in the Genome

08 Innovation Speaker Series
Daniela Seixas,
CEO of TonicApp
Fundraising in Portugal: How We Raised Our €10.85M Round for Tonic.App

09 CR Colloquia Series
Ralf Haefner,
University of Rochester
Causal Inference During Motion Perception, and Its Neural Basis

Ad hoc Seminar
Sahar Tehrani,
Tehran University of Medical Sciences
STAT1 Is Required to Establish but Not Maintain Interferon-γ-Induced Transcriptional Memory

13 CISS
Ana Maia
Immune (Dys)Function in Obsessive-Compulsive Disorder

15 Theory Seminar Series
Lea Duncker,
Columbia's Zuckerman Institute
Dynamical Mechanisms Underlying Robust Computation in Motor Cortex

Innovation Speaker Series
Anushka Patchava,
Deputy Chief Medical Officer at Vitality
From Code to Co-Pays: Crafting Innovative Digital Products for Tomorrow's Health Insurance

16 CR Colloquia Series
Ronit Satchi-Fainaro,
Tel Aviv University
C3D-Bioprinted Cancer Models for Target Discovery, Drug Development, and Personalized Therapy

Ad hoc Seminar
Juan Alvaro Gallego,
Imperial College London
Motor Control and Learning Through Interacting Neural Populations

20 Roundtable
Psychedelic Substances – From Research to Therapy, Risks and Benefits

28–29 Conference
EU Project – FAITH

29 Innovation Speaker Series
Nuno Prego Ramos,
Co-founder and CEO of CellmAbs
From Vision to Victory: Lessons From CellmAbs' Journey in Biotech Innovation

— June

05 Theory Seminar Series
Nicolas Brunel,
Duke School of Medicine
Roles of Inhibition in Stabilizing and Shaping the Response of Cortical Networks

06 Ad hoc Seminar
Esra Şenol,
National University of Singapore
Tuberal Nucleus Somatostatin Neurons in Mouse Feeding Regulation

CR Colloquia Series
Maria José Oliveira,
Instituto de Investigação e Inovação em Saúde – UP
Decoding the Extracellular Matrix at the Immunosuppressive Tumor Microenvironment: The Forgotten Partner

17 CISS
Ricardo Neto Silva | Rita Figueiredo
Threat Responses in the Fruit Fly: Dopamine Gets Defensive | Dissecting Metabolism at the Single-Cell Level

Symposium
UCL–IGC–CF Students Symposium

19 Theory Seminar Series
Daniel Durstewitz,
Central Institute of Mental Health Mannheim / Heidelberg University
Learning Dynamical Systems From Data With Applications in Neuroscience

20 CR Colloquia Series
Julie H. Simpson,
University of California Santa Barbara
Command, Connect, Clean: Mapping Neural Circuits for Fly Grooming as a Model Motor Sequence

24 CISS
Raquel Lemos | Maria Iliopoulou
Cognitive Complaints and Neuropsychological Performance in Cancer: The Role of Affect | Spatial Bone Marrow Niches Shaping cDC2 Differentiation

Ad hoc Seminar
Mario Penzo,
National Institute of Mental Health
The Paraventricular Thalamus and the Control of Goal-Oriented Behavior

24–03 Jul Course
1st Annual Portugal – USA Cancer Summer Course

27 CR Colloquia Series
João T. Barata, Instituto de Medicina Molecular / Faculty of Medicine of Lisbon University
IL-7 and IL-7R in Acute Lymphoblastic Leukemia

Ad hoc Seminar
Juan M. Lozano-Gil,
University of Murcia
Targeting the Zakα/P38/Nlrp1 Axis as a Novel Therapeutic Strategy for Hematopoietic Disorders Associated With Chronic Inflammation and Congenital Anemias

— July

01 Public Lecture
Ronald A. DePinho,
University of Texas MD Anderson Cancer Center
Exploration of the Unknown in the Age of Science

Innovation Speaker Series
Inês Ayer,
Senior Designer at Pentagram
Beyond Functionality: The Art of Designing Health Tech Products

04 CR Colloquia Series
Tannishtha Reya | Robert Wechsler-Reya,
Columbia University
Tracing the Origins of Cancer: A Stem Cell Perspective | Less Heat, More Light: Discovering Smarter Therapies for Pediatric Brain Tumors

11 CR Colloquia Series
Michael T. McManus, UCSF
Innovative High-Throughput Approaches to Understanding and Combating Cancer

Ad hoc Seminar
Giuseppe Diaferia,
European Institute of Oncology & Anguraj Sadanandam, Centre for Global Oncology & Research
Histologically Resolved Transcriptional States Unveil Functional Vulnerabilities in Pancreatic Adenocarcinoma

15 CISS
Bruna Costa
zAvatar-Test Forecasts Patient's Treatment Outcome in Colorectal Cancer

16 Conference
Medica AI – The Conference

22 CISS
Ábel Ságodi | Tiago Costa & Jordi Torrents
Back to the Continuous Attractor | Contrastive Learning as a Tracking Algorithm in idtracker.ai

29 Mentoring Workshop
Michael T. McManus, UCSF
Difficult Conversations and Swimming in Literature

31 Innovation Speaker Series
Irina Ramos,
AstraZeneca Biomanufacturing
Development as the Focus of Innovation and Sustainability in the Biopharma Industry – How to Prepare for the Next Pandemic

— September

04 Innovation Speaker Series
Piet Hein van Dam,
CEO and Founder of Clear.bio
Spotify Tells You What to Listen To, Netflix Tells You What to Watch, Nobody Tells You What to Eat

06 Lecture
Memming Park
AI & Law

09 CISS
William Podlaski
Rethinking Neural Networks: A New Perspective on Computation With Spikes

12 CR Colloquia Series
Andreas Wack,
The Francis Crick Institute
Lung Infections, Interferons, Macrophages: The Good, the Bad and the Unexpected

Innovation Speaker Series
Noah Robinson,
CEO & Founder of Innerworld
Expanding Access to Mental Healthcare Through Digital Therapeutics in the Metaverse

16 CISS
María Martínez Lopez
Dendritic Cells, Bridging Neuromodulation and Immunity

Information Session
– 10X Genomics
Agnieszka Ciesielska
New Era of Single Cell and Spatial Transcriptomics

17 Ad hoc Seminar
Markus Gerhard,
Technical University of Munich
CD8+ Tissue-Resident Memory T Cells Confer Protection From an Extracellular Pathogen in the Stomach

18–19 Summit
CIMT Cancer Cell Therapy Summit 2024

19 CR Colloquia Series
Luigi Petrucco,
Italian Institute of Technology
Neural Dynamics and Architecture of the Heading Direction Circuit in Zebrafish

19–21 Conference
International Congress on Neurodegenerative Diseases

23 CISS
Rory Beresford | Marco Colnaghi
Predictive Cravings: Unravelling the Menu of Mating in Drosophila melanogaster | Bounded Accumulation of Evidence about Safety Determines Freezing Duration in Flies

Ad hoc Seminar
Sidonia Fagarasan,
RIKEN / Kyoto University
Secreted Immunometabolites and Metabolic Circuits Intersecting Adaptive and Innate Immunity

26 CR Colloquia Series
Mauro Gaya,
Luminy Center for Immunology
B Cell Memory in Barrier Tissues

30 CISS
Nuno Machado | Margarida Sousa
Exploring the Neural Basis of Egg Laying in Drosophila | An Evolving Distributional Map of Future Reward in Midbrain Dopamine Neurons

— October

01 Ad hoc Seminar
Klaas Enno Stephan,
University of Zurich & ETH Zurich
Translational Neuromodeling, Computational Psychiatry and Computational Psychosomatics

02 Innovation Speaker Series
Benjamin Joffe,
Partner at SOSV
Lessons Learned From SOSV's 200+ Deep Tech Investments

03 CR Colloquia Series
Fränze Progatzky,
University of Oxford
Glial Regulation of Barrier Tissues in Development, Health and Disease

07 CISS
Mahmoud Elmakki | Inês Laranjeira
"What Is the What?": A Biography of the Lost Neural Latent States | If Behavior Were a Language, What Would Mice Be Saying? Looking for Meaning in Task Variability

08 Conference
ZDM17 – 17th Annual Meeting of the Zebrafish Disease Models Society

14 CISS
Ana Queirós | Maria Carolina Iláco
Predicting Caregiver Burden in Multiple Myeloma Using Machine Learning Models – A National Clinical Study | Segmentation of Brain [18F] FDG PET Imaging Using Deep Learning to Improve Quantitative Assessment and Differential Diagnosis

15 Theory Seminar Series
André Martins,
Instituto Superior Técnico (IST)
Tutorial

16 Theory Seminar Series
André Martins, IST
Seminar: Dynamic Sparsity, Associative Memories, and Reranking Laws for Language Generation

16–18 Champalimaud Research Symposium 2024
The Ecology of Cancer: Understanding and Targeting Cancer-Host Interactions

21 CISS
Nicolas Gutierrez | Dean Rance
A Hypothalamic Node for the Cyclical Control of Female Sexual Rejection | The Predicted Brain: A Transformer Model of Activity-Dependent Fluorescence

23 Innovation Speaker Series
André Eiras Dos Santos,
Sword Health
Building Sword Health – AI Care Pioneer and Fastest-Growing Digital Health Company

23–25 Annual Meeting
H2020 Project FindingPheno

23–26 Conference
Botton–Champalimaud International Pancreatic Cancer Conference

28 CISS
Bruna Martins Garcia | Kristin Fischer
Does Metastasis Require a Metabolic Match With Distant Tissues? | The Enteric Immune Landscape in Response to High-Fat High-Sugar Diet

Outreach

— November

04 CISS
Beatriz Belbut | Romain Sala
Visual Experience Shapes the Structure of Surround Modulation in Mouse Visual Cortex | Cerebellar Contribution to the Offline Consolidation of Learning

06 Innovation Speaker Series
Ksenia Yashina, Orbem
From Lab to Farm: Unleashing AI-Powered MRI for a Sustainable Food Industry

07 Ad hoc Seminar
Camila Veludo
How Cell Competition Regulates T Lymphocyte Differentiation

CR Colloquia Series
Soojin Ryu, University of Exeter
Life-Long Consequences of Early Life Stress Exposure in Zebrafish

11 CISS
Mafalda Valente | Joaquim Contradanças
Investigating the Role of Auditory Cortex in Decisions About Sound Lateralisation | A Head-Restrained Paradigm to Study Delay and Trace Conditioning in Zebrafish Larvae

14 CR Colloquia Series
Cédric Maurange, Developmental Biology Institute of Marseille
Investigating Regulatory Principles of Cellular Trajectories and Hierarchies in Minimal Models of Pediatric Cancers

18 COpS
Gonzalo de Polavieja | Mireia Castillo
The Roles of AI in Scientific Discovery: Our Experience Studying Collective Behavior | Molecular Characterization of Cancer by Spatial Pathology

Innovation Speaker Series
Hossein Jalali, Virtuleap
Virtuleap – Brain Training and Assessment Using VR

Theory Seminar Series
Alexander Mathis, EPFL
Seminar: Leveraging Biomechanics to Gain Insights Into the Sensorimotor System

21 Theory Seminar Series
Alexander Mathis, EPFL
Tutorial: From Statistical to Mechanistic Models

CR Colloquia Series
Ana Luísa Carvalho, University of Coimbra
MicroRNA-Mediated Control of Synaptic Transmission in Chronic Stress

25 CISS
Miguel Rendas
Circadian Regulation of Pulmonary Immunity by Neuroendocrine Signals

28 CR Colloquia Series
Felix Wensveen, University of Rijeka
Why We Get Sick: Immune-Mediated Modulation of Systemic Metabolism in Context of Disease

— December

02 CISS
Guido Meijer | Guillermo Martin
Serotonin Regulates Internal States Without Affecting Goal-Directed Behavior | Three Types of Remapping With Linear Decoders: A Population-Geometric Perspective

03 Meeting
ThermoFisher Scientific PowerUp Day

05 CR Colloquia Series
Lisa Stowers, The Scripps Research Institute
Leveraging Olfaction to Study Social Behavior in the Mouse

09 Ad hoc Seminar
Joern Diedrichsen, Centre for Brain and Mind
How Do Cerebellum and Neocortex Work Together Across Functional Domains?

18 Theory Seminar Series
Alexandre Pouget, University of Geneva
Seminar: Neural Models of Compositionality

— January

04 Ar Magazine Article
Ar Event: Roots of AI – The decades-long, up-and-down story of artificial intelligence

09 School Visit to CF
External Partner: Colégio Guadalupe

17 Workshop for Scientists
Ciência di Noz Manera mentoring programme
External Partner: iMM, RAISE consortium

25–26 Activities at Schools
Ciência di Noz Manera Phase I
External Partners: Escola Dr. Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

30 Ar Magazine Article
Champalimaud Foundation PhD Student Diaries – December Edition

31 School Visit to CF
External Partners: Escola Secundária da Amadora

— February

02 Ar Magazine Article
Disentangling the brain's symphony of the senses

07 Activities at Schools
Ciência di Noz Manera Phase I
External Partners: Escola Dr. Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

11 Online Awareness Campaign
Women & Girls in Science: a Selection of Creative Approaches that Led to Breakthroughs at the Champalimaud Foundation

12 Ar Magazine Article
A Flickr of Truth: Piercing the "Continuity Illusion"

15 School Visit to CF
External Partner: Colégio Campo de Flores

17 Art and Science activities
Science on the Walls
External Partner: Kids Dive

19 Ar Magazine Article
One Step Forward, No Steps Back: New Study Advances Understanding of Dopamine's Role in Movement

20 School Visit to CF
External Partners: Colégio Campo de Flores School Visit to CF | Agrupamento de Escolas D. Filipa de Lencastre

21 Activities at CF
Ciência di Noz Manera Phase II
External Partners: Escola Dr. Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

School Visit to CF
External Partner: Oeiras International School

23 School Visit to CF
External Partner: Instituto Superior Técnico

28 Ar Magazine
Champalimaud Foundation PhD Student Diaries – January Edition

— March

06 School Visit to CF
External Partner: Escola Secundária Fernando Lopes Graça

11 School Visit to CF
External Partner: ISPA – Institute of Applied Psychology

Paediatric Cancer Symposium Tours to CF

School Visit to CF
External Partner: Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

12 School visit to CF
External Partner: Escola Básica e Secundária Josefa de Óbidos

14–15 Brain Awareness Week X Science on the Walls
Interview and Video Workshop
External Partner: Associação Moinho da Juventude, Cova da Moura

19 Ar Event from the series Past, Present & Future of AI
Living with AI

27 School Visit to CF
External Partner: Biomedical Students and Teachers from Liège University

28 Ar Magazine
Champalimaud Foundation PhD Student Diaries – February Edition

— April

02 Ar Magazine Article
"Zombie Neurons" Shed Light on How the Brain Learns

10, 17, 24 Mentoring Programme at Schools
Ciência di Noz Manera Phase III

External Partners: Escola Dr. Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

11 School Visit to CF
External Partner: Escola Secundária da Sertã

School Visit to CF
External Partner: Escola Secundária Rainha Dona Amélia

16 School Visit to CF
External Partner: Agrupamento de Escolas Fernão Magalhães

16, 19, 24 Operation Kite
Celebrating the 50th anniversary of the 25th of April in Portugal

24 Ar Magazine Article
Benefits and Challenges of Living with AI

25 Ar Magazine Article
Vitamin DAlters Mouse Gut Bacteria to Give Better Cancer Immunity

29 School Visit to CF
External Partner: Escola Secundária Emídio Navarro

Ar Magazine Article
Champalimaud Foundation PhD Student Diaries – March Edition

30 School Visit to CF
External Partner: Pupilos do Exército

— May

01 Ar Magazine Article
The Auditory Cortex Sends Non-Visual, Non-Topographic Spatial Signals to the Visual Cortex

02 Online Awareness Campaign
Be Open About Animal Research Day – Get On #BOARD24
External Partner: EARA

07 Ar Event from the series Past, Present & Future of AI
Shapping Intelligence

08, 15, 29 Mentoring Programme at Schools
Ciência di Noz Manera Phase III
External Partners: Escola Dr Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

10 Ar Magazine Article
What was that? – How Brains Convert Sounds to Actions?

14, 21, 28 Online series, episodes 1, 2 and 3
What Am I Looking At?
O que é isto?

15 Champalimaud scientists at the Pint of Science Festival

18 Art and Science Education with Science on the Walls and Metamersion
External Partners: Cova da Moura Homework Club, Moinho da Juventude, UK Embassy, Cape Verdean Embassy

29 School Visit to CF
External Partner: Escola Secundária Emídio Navarro

31 Ar Magazine Article
Champalimaud Foundation PhD Student Diaries – April Edition

— June

04, 11, 18, 25 Online series, episodes 4, 5, 6 and 7
What Am I Looking At?
O que é isto?

05 School Visit to CF
External Partner: Escola Rainha Dona Amélia

Ar Magazine Article
Clinical Study Shows "zAvatar-test" has high predictive power for personalising colorectal cancer treatment

Operation Kite
Installation at Champalimaud Research Floors Celebrating the 50th anniversary of the 25th of April in Portugal

18–19 Ciência di Noz Manera Focus Groups with Scientists
External Partners: Escola Dr. Azevedo Neves, Escola do Alto do Lumiar, iMM, RAISE

19 Ar Magazine Article
What Can be Said About the Future of Artificial Intelligence?

21 Presentation and Q&A with scientists
PhD, now what?
External Partners: Nova Medical School

26 Science Comes to Town
External Partners: Pavilhão do Conhecimento – Ciência Viva

27 Ar Magazine Article
Champalimaud Foundation PhD Student Diaries – May Edition

— July

02 Online series, episode 8
What Am I Looking At?
O que é isto?

03 Science on the Walls Stand
External Partners: BCSD – Business Council for Sustainable Development

09 Visit from Science Communication Colleague
External Partners: INL – International Nanotechnology Laboratory

17, 31 Neuroart: Paint & Drink
External Partners: Pavilhão do Conhecimento – Ciência Viva

29 Ar Magazine Article
Champalimaud Foundation PhD Student Diaries | June Edition

— August

08 Ar Magazine Article
Scientists Unravel How the BCG Vaccine Leads to the Destruction of Bladder Cancer Cells

12 Ar Magazine Article
Pink Elephants in the Brain? How Experience Shapes Neural Connectivity

— September

3, 4, 10, 11 Science on the Walls Summer camp
External Partners: Cova da Moura Homework Club, Moinho da Juventude

10 PhD Orientation Week
INDP and ICDP PhD students

27 European Researchers' Night
Connecting research and art through a broken telephone | What Am I Looking At? O que é isto? | Guided tour with group for the deaf community (Ciência + Animais) x Speed Dating = Isto promete! | The Sound of Neuroscience Follow your gut
External Partners: Pavilhão do Conhecimento – Ciência Viva, Museu de História Natural da Universidade de Lisboa, ITQB NOVA and Marina de Oeiras

— October

10 Ar Magazine Article
First Complete Wiring Diagram of An Adult Brain Unveiled

14 School Visit to CF
External Partner: NEB2B2 – Faculdade de Ciências da Universidade de Lisboa

16 Champalimaud Research Symposium Tours to CF

22 School Visit to CF
External Partner: Agrupamento de Escolas D. Dinis

28 Ar Magazine Article
Exploring Tumor-Body Interactions: Highlights From #CRSY24

30 Ar Magazine Article
Internal "Clocks" of Immune Cells are Essential for the Proper Functioning of the Metabolism

— November

08 Kickoff International Journey ISS Expedition
External Partner: Escola Secundária de Miraflores

13 Ar Event
The State of Water

14 Round table discussion on Science Integrity – POIESIS project
External Partner: ISCTE – University Institute of Lisbon

18 Ar Magazine Article
How Tiny Fish Reveal Big Insights Into Behaviour

Ar Magazine Article
Parkinson's Paradox: When More Dopamine Means More Tremor

18–20 Presenting What Am I Looking At? – Communicating Discovery Science Symposium
External Partners: The Kavli Foundation, CREST – Centre for Research and Evaluation Science, Science Public Engagement Initiative and Technology and Stellenbosch University

19 School Visit to CF
External Partner: ISPA – Institute of Applied Psychology

25 Ar Magazine Article
Key Brain Circuit for Female Sexual Rejection Uncovered

25–29 Presenting at Human Centred Design Week
External Partners: Fraunhofer Portugal, AICOS

26 School Visit to CF
External Partner: Externato de Penafirme

26 Ar Magazine Article
Strengthening SciComm, From Portugal to South Africa

27 Book Launch on Careers in Neuroscience
External Partners: Brain Gain, Universidade de Coimbra, Teatro Nacional de Gil Vicente

— December

09 Ar Magazine Article
Raising the Standard in Therapy With Psychedelics

10 School Visit to CF
External Partner: Escola Secundária de Loulé

Workshop on Sign Language and Inclusivity
External Partner: Portuguese Sign Language Teachers

12 Ar Magazine Article
For the First Time, Researchers Detect Pre-Malignant Pancreatic Cancer Lesions with Magnetic Resonance Imaging

13 Cyanotopy Workshop – Special Happy Hour

17 Ar Magazine Article
More Calories – More Consumption

19 Ar Magazine Article
2024 Season's Greetings Card

The 2024 Champalimaud Research (CR) Annual Report is a celebration of co-creation and uniqueness, capturing a year of creativity and the CR community's one-of-a-kind culture. From headline-making research and craft-inspired initiatives to memorable retreats and scientific events, 2024 was marked by both originality and teamwork.

To bring this energy to the surface – quite literally – we invited members of our community to create the physical covers of this report. Each printed copy is wrapped in a unique hand-painted sleeve, forming a fragment of a larger, collective artwork. Together, these sleeves reflect not only individual expression but a culture shaped by working side by side.

The base for this piece was a simple grid – a visual structure echoing the systems and frameworks that support our work at CR. Just as our Foundation provides the conditions for innovation, the grid served as a starting point – one that each participant was encouraged to explore, challenge, and reimagine.

The result is no "one-person show", but a tangible metaphor for how we work: within shared structures, through constraints and collaboration – and always pushing further, finding solutions, and going beyond.

This year, we invite you to judge the book by its cover.

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