

2021

Champalimaud Research Annual Report 2021 ;

The goal of Champalimaud Research (CR) is to perform world-leading fundamental and translational research. Current research work is focused on the fields of neuroscience, physiology and cancer.

CR hosts three programmes that explore the core research areas of the Foundation:

Champalimaud Neuroscience Programme;

Champalimaud Physiology and Cancer Programme;

Champalimaud Experimental Clinical Research Programme.

A Research Direction Committee was appointed to coordinate this endeavour. It is comprised of three scientific directors representing the three programmes: Joe Paton, Henrique Veiga-Fernandes and Celso Matos. Together, the committee carries out the scientific aim of the Champalimaud Foundation: to explore new avenues of investigation, while reinforcing the links between research and clinical activities.



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Home to the future centre
dedicated to Human Neuroecology
and Digital Therapeutics.

Foreword

CR Directors:

Celso Matos, Champalimaud Experimental Clinical Research Programme

Henrique Veiga-Fernandes, Champalimaud Physiology & Cancer Programme

Joe Paton, Champalimaud Neuroscience Programme

2021 was supposed to be the year we returned to a more normal way of life. Instead, we faced new COVID-19 case surges, and all of the associated challenges and uncertainty that the pandemic continues to produce. However, there was also reason for hope, with the arrival of vaccines and the committed response of the Portuguese people, who quickly reached one of the highest levels of vaccination worldwide.

The vaccines have brought into the public spotlight the crucial need for fundamental science: research that seeks to understand how the world works. It was curiosity-driven research that enabled not only the design of a new type of vaccine, but also all the preceding steps, from the discovery of the inner-workings of the immune system to the development of the essential mathematical tools that are at the heart of the scientific endeavour.

Champalimaud Research (CR) was established with a strong core of fundamental science, beginning with the formation of the Neuroscience Programme in 2007. Over the years, the programme has unravelled diverse aspects of the functioning of the brain and the central nervous system. In 2021, embracing the importance of implementing advanced quantitative

approaches for understanding the brain, an organ that is most evidently computational in nature, the Neuroscience Programme decided to reinforce existing capabilities in these areas by hiring Daniel McNamee and Il Memming Park, experts in computational neuroscience and machine learning. Other researchers will arrive at the CCU in 2022, joining the existing 12 Neuroscience labs.

The fundamental research faculty at CR was further reinforced with the addition of Ana Luísa Correia in 2021, who investigates how cancer cells remain dormant, to the faculty of the Physiology and Cancer Programme. This programme, formed in 2015, now counts six research labs that explore a large scope of topics including the basic mechanisms in cell biology, cancer and immunology.

While deeply engaged in fundamental research at CR, we always hold our gaze towards the future, striving to channel discoveries towards practical applications. As such, 2021 was marked by an exuberant engagement in the virtuous cycle between fundamental and applied science; the engine that drives the development of technology, tools, and, in the case of biology, prevention and treatment of disease.

A clear example was the inauguration of the Botton-Champalimaud Pancreatic Cancer Centre in September 2021, which will combine the efforts of scientists from CR's Physiology and Cancer Programme, CR's Experimental Clinical Research Programme and clinicians, who will investigate and treat this disease, which is a leading cause of cancer death in Europe.

Such interactions between clinical and research efforts have been at the core of the Physiology and Cancer Research Programme. For instance, this year the European Innovation Council awarded a generous grant to a biotech company hosted at the Champalimaud Foundation for the development of immunotherapy drugs, based on fundamental breakthroughs being generated under the same roof. Furthermore, insights in the field of cellular biology gained here hold promise for future clinical applications such as personalised COVID-19 risk assessment and cancer diagnosis.

Another notable translational initiative by the Neuroscience Programme is the development of a new centre dedicated to "digital therapeutics", which was crystallised with the launching of the Ocean Campus in December, 2021. Set to be constructed along the riverbank adjacent to the Champalimaud Foundation, this hub will combine neuroscience, artificial intelligence and machine learning, engineering, and clinical know-how to develop behavioural interventions for

health that work through software. This ambitious project reflects a deep appreciation for what we have learned through the fundamental neuroscience since the establishment of the programme: by controlling the environment and shaping behaviour we can profoundly influence brain function as well as the body's physiology in general.

Through it all, the Experimental Clinical Research Programme, established in 2019 with eight labs, continued to serve as a major driving force of translational science. In 2021, these labs collaborated with medical staff at the Champalimaud Clinical Centre to establish innovative personalised cancer therapies as well as novel diagnosis methodologies for neural disorders and cancer.

These exciting clinical developments serve to remind us of the critical role fundamental research is yet to play in kindling the clinical applications of tomorrow. Despite the significant strides we have made towards understanding the functioning of the nervous system, cancer and other diseases, we are still far from unlocking all their secrets.

Always mindful of the necessity for fundamental discovery to drive applied solutions, the research groups of the Champalimaud Foundation will continue their unwavering effort to set new paths leading us deeper in the pursuit of knowledge and forward towards benefiting the well-being of all humankind.



The Botton-Champalimaud Pancreatic Cancer Centre.

Champalimaud Foundation

Through scientific breakthroughs and clinical developments, the Champalimaud Foundation is there to help those who are most in need.



Leonor Beleza, President
João Silveira-Botelho, Vice-president (right)
António Horta-Osório, Non executive director (left)

The will and testament of the Portuguese entrepreneur and industrialist, António de Sommer Champalimaud, laid a path for the creation of an ambitious biomedical research institution, under the leadership of Leonor Beleza. Since 2005, hundreds of researchers, support staff, physicians and other healthcare professionals from around the world have joined this mission. At the Champalimaud Centre for the Unknown, the members of Champalimaud Research and the Champalimaud Clinical Centre work together to advance our understanding of biological processes and search for new clinical tools in the fight against oncological, neurological and mental diseases. Alongside these research programmes is a state-of-the-art clinical facility which offers the highest standard of care to patients.

For the Champalimaud Foundation, like most scientific institutions, flexibility may have been the operative word for 2021. We adjusted to a constantly changing reality, to setbacks and breakthroughs, to hardships and achievements. The path that was followed in 2020, when the

pandemic hit us all in an unprecedented way, was, to some extent, reactive. That was no longer the case this year. Fully aware of the challenges that we faced, the uncertainty was absorbed as being part of our reality and shaped our activities and culture, never losing track of where we were going.

Our desire to innovate in the face of new challenges is evident throughout our institution. The new “Botton-Champalimaud Pancreatic Cancer Centre” was inaugurated this year and will open its doors in 2022 so that we can invest more resources in the scientific and clinical response to one of life’s greatest threats. Likewise, we announced a new Centre which will accommodate our artificial intelligence programme and allow us to extend our research and clinical activities to new areas, promoting interactions between science, medicine and industry.

The last two years have been a clear reminder that we cannot escape uncertainty, but we can definitely have a say on how we want to face it.

Structure



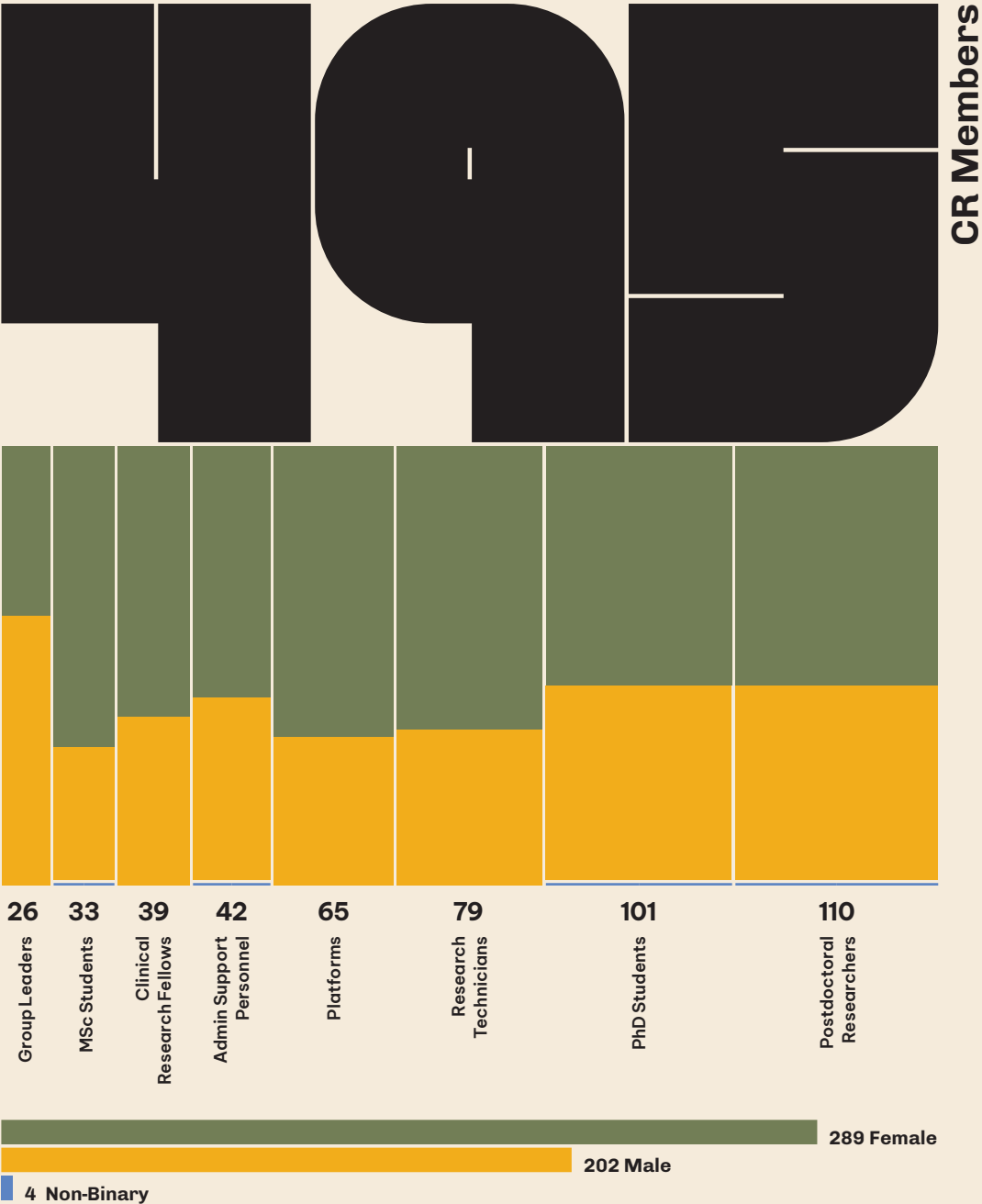
Champalimaud Research

Direction Team
Celso Matos, Henrique Veiga-Fernandes, Joe Paton



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

CR Community in Numbers





Neuroscience

Physiology
& Cancer

Experimental
Clinical Research

Research Groups

Champalimaud Research integrates scientists and students organised into Groups, leading independent curiosity-based research programmes while fostering interactions between clinical, applied and basic research.

Images in this chapter are artistic renditions of original scientific figures.

Neural Circuits & Behaviour

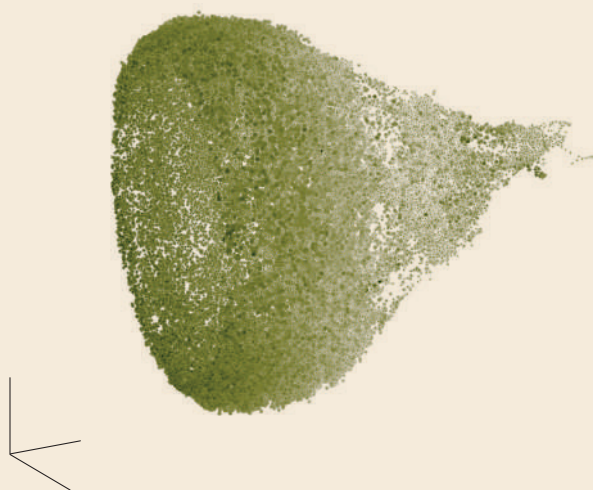
Studying the neural circuits for learned and coordinated movement in mice.

Methods

Quantitative behavioural analysis, Neurophysiology, Optogenetics, Chemogenetics

Model Organism

Mice



To study how the brain controls different aspects of locomotion, the team combines machine vision techniques with computational analysis. In this image, each point corresponds to limb positions as they change over time. Together, the three-dimensional cloud of points reveals the dynamic structure of mouse locomotor behaviour.

Figure adapted from Gonçalves et al., Arxiv 2021.

Carey Lab

Principal Investigator
Megan Carey



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MSc Students
Maria Inês Ribeiro
Guilherme Pata
Pedro Castelhanito

Technician
Ana Colaço

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 that is critical for coordinated motor control and motor learning and whose circuitry is well characterised. The lab's major achievements so far include establishing a quantitative framework to identify specific cerebellar contributions to mouse locomotor coordination (Machado, Darmohray et al., eLife 2015; Machado et al., eLife 2020); dissecting circuit mechanisms for modulation of cerebellar learning by behavioural state (Albergaria et al., Nature Neuroscience 2018); and 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.

Last year was a challenging one for researchers and for society. The ongoing COVID-19 pandemic exacerbated societal inequalities (Sandi and Carey, Neuron 2021) and highlighted the urgency of effectively communicating about science with the public. Members of the lab participated in numerous outreach activities in association with the CF and other international organisations. I became Chair of the ALBA Network for Equity and Diversity in Brain Sciences and launched the ALBA Declaration on Equity and Inclusion, for which the Champalimaud Foundation contributed the design and was the first institutional signatory. ■

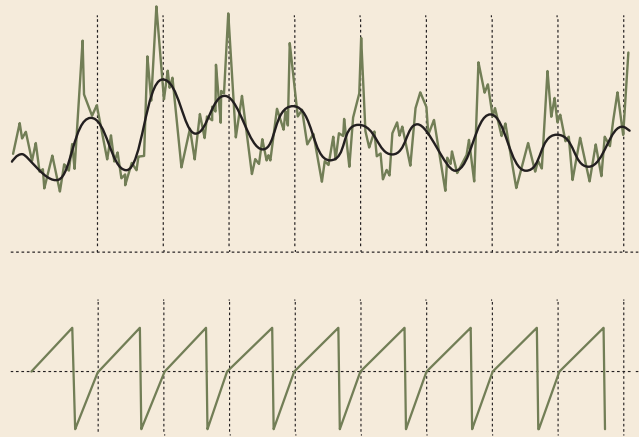
careylab.org

Sensorimotor Integration

Neural circuit mechanisms for self-motion estimation and movement correction.

Methods
Optical imaging,
Electrophysiology,
Behaviour, Genetics,
Modelling

Model Organism
Fruit flies



Simultaneous recording of the activity of visual neurons and fly locomotion provided insight into how the brain integrates sensory and motor information. Specifically, we found that the stride-cycle modulates the activity of visual neurons in a manner that depends on the stance phase. Steps with longer stance duration (low walking speed) inhibit visual neurons, thereby tuning the visual circuit as a function of the speed of the fly.

Figure adapted from Fujiwara et al, BioRxiv. 2021.

Chiappe Lab

Principal Investigator
Eugenia Chiappe



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Elise Cheynet

Behaviour is the result of many different movement control systems that are orchestrated as a function of the current circumstances of the animal, its behavioural goals and previous experience. However, how this orchestration is organised within the activity of neural circuits distributed across the central nervous system, is poorly understood. To address this question, we perform quantitative analysis of behaviour and neural activity to understand how the body and brain interact to support goal-directed walking on the fly as she explores a novel environment and interacts with conspecifics.

Our work on how flies structure their exploratory walking behaviour uncovered that many systems operate in parallel to control different aspects of locomotion and can oftentimes oppose each other. We revealed that the fly's self-generated visual information tunes down postural reflexes when the flies intend to walk straight-forward at high speed, thereby rendering walking less stable at the expense of the behavioural goals of the fly. ■

Mathematics of Behaviour & Intelligence

Mathematical modelling of how interacting units (natural or artificial) give rise to intelligent behaviour.

Methods
Mathematical modelling, Machine Learning, Behavioural analysis, Learning methods

Model Organism
Zebrafish



Algebraic Machine Learning is a technique developed to find rules in the data as features that are invariant during training. Shown here are some of the algebraic elements produced tentatively by the system as possible invariants in a simple problem.

Polavieja Lab

Principal Investigator
Gonzalo de Polavieja



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PhD Student
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MSc Student
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Emilio Suarez
Francisco Heras
Francisco Romero
Panos Firmpas

Technician
Dylan Feldner-Busztin

Our approach consists in applying novel mathematical techniques to shed light on problems relevant in Neuroscience. First, we are deciphering the interaction rules in collective animal behaviour. We contribute with new open-source tools like `idtracker.ai`, `idmatcher.ai`, and trajectory tools as well as with models like `SocialNet`. We have used these tools to find out how animals interact in groups. Each animal in a group is influenced most by those animals moving at higher speed, which correlates with their confidence on the evidence for good or bad places to go to. Second, we are developing an approach to learning that facilitates its scientific study. We are applying methods from Model Theory to Learning from data and prior knowledge in an accurate yet transparent way. We call this approach Algebraic Machine Learning and we are so far giving results in the form of three arXiv papers. We have learned from this approach the importance of finding features in the data that are invariant along training.

David Mendez and Emilio Suarez, two mathematicians, have joined the lab. They are working on algebraic machine learning, contributing with new techniques. Panos Firbas and Dylan Feldner-Busztin have also joined the lab and they are working at the interface of Machine Learning and Biology. These four new members have H2020 contracts ending in 2024 and 2025. Carolina Pádua has also joined the lab on an FCT contract to use Machine Learning techniques in collective behaviour. Francisco Romero and Francisco Heras have left the lab for new adventures after many years contributing to the study of collective behaviour. ■

Neuroethology

We are interested in understanding the neural circuits controlling sexual behaviour.

Methods

Calcium imaging,
Electrophysiology,
Viral tracing,
Optogenetics,
Behaviour

Model Organism

Mice



Graphical abstract from Dias et al., eNeuro 2021. In this study, the team demonstrated that sexual receptivity and rejection may be orchestrated by the same brain region.

Design by: Gil Costa.

Lima Lab

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Carolina Duro

Sex is fundamental for species maintenance, evolution and human well-being. Despite the fundamental characteristics of this behaviour, we are still quite ignorant of the mechanisms controlling it. We take advantage of the mouse, both the male and the female, to understand the principles of the sexual interaction leading to its end-point: ejaculation. We use state-of-the-art methods grounded on genetics-based tools to unravel the circuits controlling this behaviour.

Last year, we implemented activity-dependent methods for capturing neuronal ensembles that are active during a pre-selected behaviour of interest. The method not only allows us to identify neuronal populations active during that particular behaviour, but to also express genetic-based tools, such as opto- and chemogenetic methods, to manipulate the activity of those neurons during behaviour. As such, we have successfully labelled and manipulated hypothalamic neurons involved in the control of male mating behaviour and female lordosis, shedding light onto the mechanisms controlling this fundamental behaviour. ■

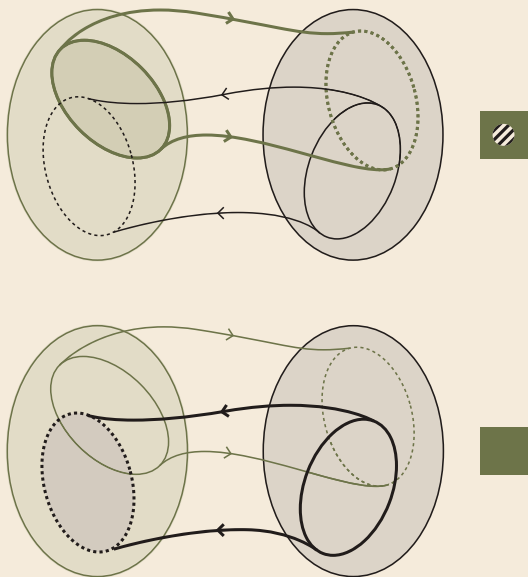
lima-lab.org

Theoretical Neuroscience

We seek to understand how neurons interact to process information.

Methods
Mathematical analysis, Numerical simulations

Model Organism
Non-Human Primates, Rodents, Zebrafish



Inter-area communication in neocortex is mainly feedforward driven when the subject observes a visual image (top) and mainly feedback-driven when the subject does not observe a visual image (bottom).

Machens Lab

Principal Investigator
Christian Machens



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Joana Carmona
Michael Pereira (Co-Sup. R. Costa)
Oihane Horno (Co-Sup. L. Petreanu)
Severin Berger

MSc Student
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Vânia Nunes

Our lab develops models of information processing in the brain using mathematical analysis and numerical simulations. These tools allow us to formulate ideas and intuitions in a precise manner and thereby put them to the test using real data. We are specifically interested in how populations of neurons interact in order to represent information. We compare experimental data across different species and brain areas in order to find common principles of how information is being represented.

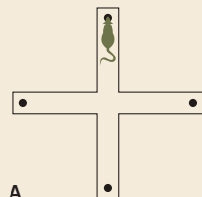
Several members of the lab graduated or left last year. Vânia Nunes and Juliana Couras graduated with a Master thesis; Allan Mancoo obtained his PhD; Nuno Calaim joined the biotech industry; and Sander Keemink became Assistant Professor at Radboud University in the Netherlands. Scientifically, we gained new insights into the nature of inter-area communication in the neocortex, and we refined our theory of how spiking neurons communicate information. ■

Systems Neuroscience

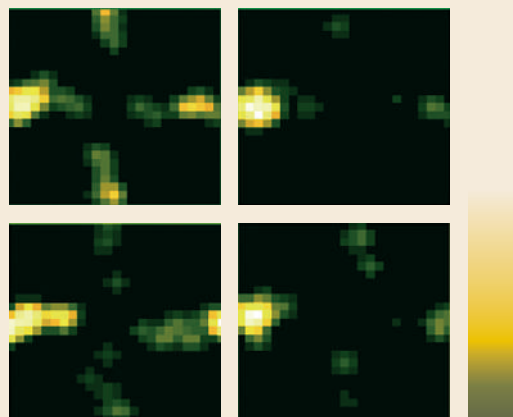
How the brain uses perceptual information to create and act on models of the world, and the role of confidence, uncertainty and neuromodulators in these processes.

Methods
Optogenetics,
Theory, Behaviour,
Electrophysiology

Model Organism
Mice, Humans



A



B

The piriform cortex links odour information to the spatial memory of important places. A) Rats learn a spatial choice task where they have to navigate to a particular location on a maze based on the odour they sample. B) Neurons from a brain region traditionally associated with odour recognition – the posterior piriform cortex – are also active in specific locations on the maze.

Mainen Lab

Principal Investigator
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Alireza Tavanfar
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Megha Patwa

International Brain Laboratory (IBL)
Michael Scharfner
Niccolò Bonacchi
Olivier Winter

*The Mainen lab hosts IBL Staff.

We are interested in understanding the principles underlying the complex adaptive behaviour of organisms. Starting with quantitative observations of animal behaviour, we aim to integrate quantitative cellular and systems level experimental analysis of underlying neural mechanisms with theoretical, ecological and evolutionary contexts. Mice provide a flexible animal model that allows us to monitor and manipulate neural circuits using electrophysiological, optical and molecular techniques. We have made progress using highly-controlled studies of a simple learned odour-cued decision task and are extending our focus toward more complex behaviours. Projects in the lab are wide-ranging and continually evolving. Current topics include (i) the function of the serotonin system, (ii) sensory decision-making, (iii) the role of uncertainty in brain function and behaviour.

A study we published last year opens up a new window to understand how the senses are used for navigation and memory. Humans rely on visual landmarks more than odours, but it's likely that the principles of how we remember where we've been and get to where we're going are very similar. ■

Poo C, Agarwal G, Bonacchi N, Mainen ZF (2021) Spatial maps in olfactory cortex during olfactory navigation. Nature. <https://doi.org/10.1038/s41586-021-04242-3>.

mainenlab.org

Behavioural Neuroscience

We are interested in the physiological and neural changes that take place within a split second upon the appearance of an external threat, allowing organisms to survive potentially deadly events.

Methods

Quantitative behavioural analysis, Cardiac and muscle *in-vivo* imaging, Genetics manipulation, Optogenetics, Neuronal anatomy

Model Organism

Fruit flies



We use a setup of flies walking on a ball under a microscope to image their cardiac activity as they are exposed to momentary visual threats. In a recent study (Barrios et al., 2021), we found that the fly's heart skips a beat upon threat appearance and then either speeds up if the fly responds by running or slows down if the fly responds with freezing.

Moita Lab

Principal Investigator
Marta Moita



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Mariana Franco

Technician
Rui Gonçalves

Animals, from fish to primates, freeze when faced with distant or inescapable threats, staying completely immobile for prolonged periods. In mammals, the large number of brain regions involved in the expression of freezing suggests that this seemingly simple behaviour requires the integration of multiple sources of information. We recently found that fruit flies also freeze in response to such threats. Using this model organism, we demonstrated that threat-induced freezing corresponds to a distinct internal state from that of spontaneous immobility, as measured by the animal's cardiac activity. Furthermore, by measuring sugar levels and resistance to starvation, we found that freezing behaviour is energetically costly, contradicting a widespread belief that freezing is an energy sparing preparatory state. We believe that describing how contextual cues modulate freezing in the fly will be instrumental for our understanding of the organisation of survival circuits in the brain. Towards this end, we are studying how flies process social and spatial environment information, and how these come to gate freezing. Given the knowledge regarding sensory detection of visual looming threats and descending neuron involved in the expression of freezing, we are now in a unique position to understand how information about a threat is integrated with cues from the environment to guide the choice of whether to freeze.

fchampalimaud.org/research/groups/moita

While the lab went back to (almost) full speed research work, several members dedicated extra time and energy to activities that contribute to the betterment of society in various ways – from greener research practises, to gender equality, and the engagement of disadvantaged communities with science. We highlight here those contributions related to the pandemic. Ricardo Neto Silva was part of a work group that studied the implementation of a sensitive saliva test for SARS-CoV-2 based on RT-LAMP. This approach would allow a rapid and less invasive SARS-CoV-2 screening, with the potential to be deployed in contexts where resources for classical testing methods are scarce. I coordinated an information campaign on anti-COVID-19 vaccines, focused on the decades of scientific research that allowed their quick development. It mobilised scientists from across research institutes in Portugal and reached a broad audience of more than 10.000 people. ■

Vision to Action

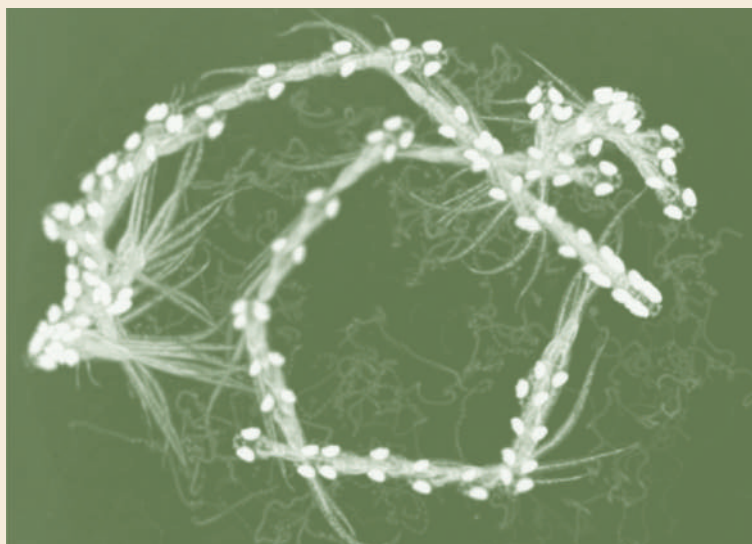
Investigating the
structure and function
of whole-brain circuits
underlying behaviour.

Methods

Imaging, Genetics,
Behaviour

Model Organism

Fish



Time projection of
a Giant Danio larva
hunting live rotifer prey.

Orger Lab

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The goal of our lab is to understand the principles governing circuit architecture, activity dynamics and behaviour in a whole-brain context, using zebrafish larvae as a model system. Our brains constantly integrate complex streams of sensory inputs, internal states and past experience to select suitable actions and execute them at the appropriate time. A major challenge in deciphering this process is that even very simple behaviours can involve networks of neurons distributed across many different areas. Small, transparent and genetically tractable zebrafish larvae allow for non-invasive optical recordings and activity manipulation of neurons throughout the whole brain of a vertebrate which shares many features with more complex vertebrate brains, from gross organisation to individual cell types and circuit motifs. In the first weeks of life, zebrafish spontaneously explore their environment and show a variety of innate visual behaviours, including hunting, predator avoidance and stabilisation responses, that incorporate fundamental elements of more complex behaviours, such as internal motivational states, decision-making, action selection, adaptation, learning, and sensory evidence accumulation.

A comparative approach in behavioural neuroscience can help us to distinguish general organising principles in the brain from specialised adaptations to a particular ecological niche, and to understand how changes in neural circuits shape behaviour on an evolutionary timescale. Working with the Fish Platform, we have introduced two new species that offer great potential for collaborative studies with zebrafish, the Giant Danio and *Danionella cerebrum*. We have begun to compare the locomotor repertoire and simple visual reflexes across all three species and to investigate how differences in behaviour are reflected in the underlying neural circuit structure. Pan-neural transgenic expression of calcium indicators in all three species now make it possible to systematically map the differences in whole brain dynamics that underlie observed behavioural variation. ■

fchampalimaud.org/research/groups/orger

Learning

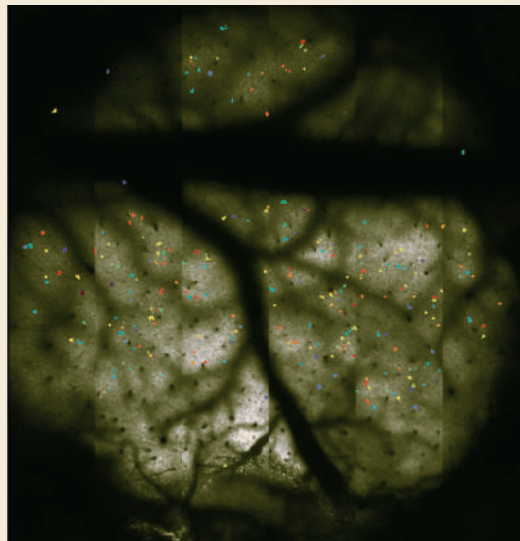
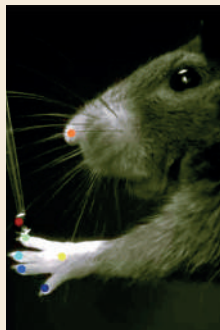
How the brain learns what to do and when to do it.

Methods

Behaviour,
Neurobiology,
Molecular biology,
Mathematical modelling

Model Organism

Rodents



To investigate the neural circuits of decision-making and control of movement, we perform simultaneous recordings of behaviour and neural activity. In this particular decision-making task, mice indicate whether a time interval is shorter or longer than 1.5 seconds. The brain view in the right panel is an example frame from a wide-field two-photon mesoscope at CF that allows for the measurement of neural activity across a large surface of the mouse cerebral cortex. Each coloured dot corresponds to a genetically targeted cell type.

Paton Lab

Principal Investigator
Joe Paton



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Renato Sousa
(Co-Sup. R. Oliveira)
Sofia Freitas
(Co-Sup. A. Renart)
Teresa Serradas Duarte
(Co-Sup. M. Carey)

Technicians
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Francisco Azevedo
Sofia Castro-Almeida

One of the major challenges in studying timing is that time is inevitably associated with changes in other variables, such as movement, or sensation. Therefore, the behaviours tested in the lab are carefully chosen to help separate neural activity which is related to time from other ongoing variables. The team studies these behaviours in rats and mice while simultaneously recording the activity of multiple neurons and manipulating their activity. This way, the team can observe how information about time can be encoded across networks of neurons. Indeed, one of the lab's largest contributions thus far has been to discover that information about elapsed time can be encoded in a kind of wave of activity that travels slowly across populations of neurons in the basal ganglia. In addition to the basal ganglia, the team also studies the thalamus and frontal areas of the cortex. A deeper understanding of these areas could have far reaching implications for grasping how people function in both healthy and pathological conditions such as addiction or Parkinson's Disease.

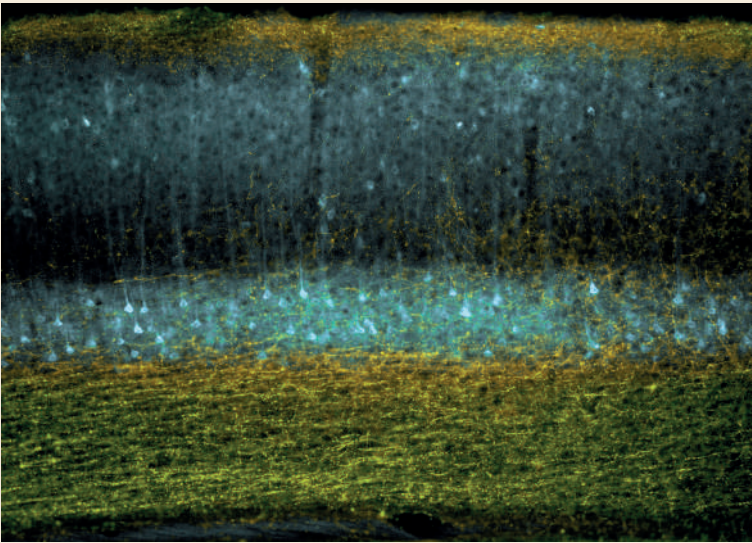
Asma Motiwala, formerly a student jointly supervised by Christian Machens and now a postdoc at Carnegie Mellon, constructed computational models to understand behaviour and neural activity of midbrain dopamine neurons collected by former lab members Sofia Soares and Bassam Atallah. She found evidence that animals compress their representations of the world to perform a decision-making task, similar to how sensory systems and image compression algorithms do to efficiently make use of resources without losing valuable information. It is one of the first studies to show that these principles of efficient coding apply in the cognitive domain as well. The work makes use of reinforcement learning, a dominant framework for many powerful modern AI algorithms, and thus may inform AI in addition to helping to understand cognition in the context of natural intelligence. ■

patonlab.org

Cortical Circuits

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

| Methods | Model Organism |
|------------------------------------------------------------------------------------------------------------------------------|----------------|
| Two-photon imaging, Optogenetics, Electrophysiology, Quantitative behaviour in virtual reality environments, Circuit-mapping | Mice |



Neurons in the visual cortex and its afferent axons are simultaneously recorded using optical methods revealing how cortical areas interact with each other.

Petreanu Lab

Principal Investigator
Leopoldo Petreanu



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Flora Vasile
Marina Fridman

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Gabriela Fioreze
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Radhika Rajan
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Solene Sautory

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Gonalo Ferreira
Margarida Baeta

Our brain is constantly interpreting the environment around us to plan and guide our actions. This requires combining sensory inputs with internal models of the world. We study how this process emerges from networks of neurons in the mouse neocortex. Using optical, electrophysiological and behavioural methods we investigate how different cortical areas learn and store knowledge about expected regularities of the world and how these are combined with sensory information to give rise to perception.

Hedi Young, a doctoral student in the lab, defended his thesis and his work on looped inter-area circuits in mouse visual cortex was published in the journal eLife. In this study, we found evidence that the cortex engages in long-range loops, where cells projecting to a given cortical area receive preferential reciprocal input from that same area in a “Talk to me and I’ll talk back to you” manner. These inter-areal loops show remarkable specificity, often involving the mysterious branches that certain cell types in the deep layers of the cortex extend to the surface of the brain. ■

Circuit Dynamics & Computation

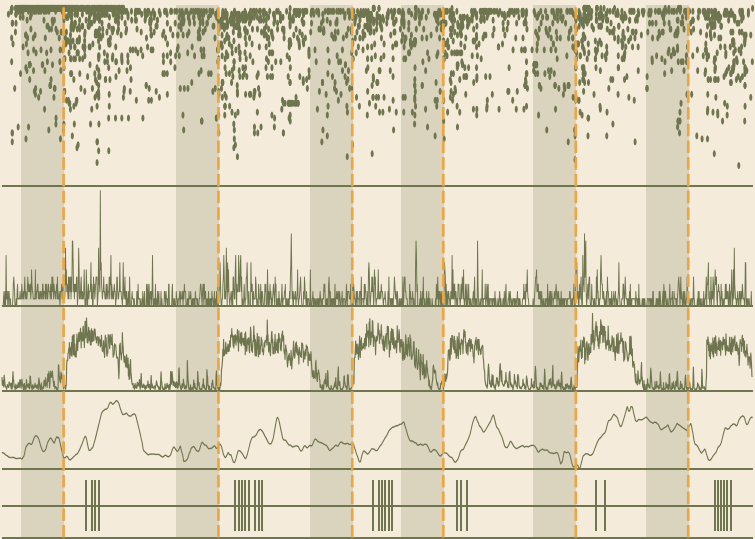
We are interested in identifying generic computational principles at play during decision-making.

Methods

Behaviour, Theory, Electrophysiology, Optogenetics

Model Organism

Rats, Mice, Humans



To investigate how different regimes of ongoing spontaneous activity shape the perception of sensory stimuli, we simultaneously record several neural (top two plots) and behavioural (bottom two plots) variables.

Figure adapted from Reato et al., bioRxiv, 2021.

Renart Lab

Principal Investigator
Alfonso Renart



Postdoctoral Researchers
Davide Reato
João Afonso
Raphael Steinfeld

PhD Students
Ana Mafalda Valente
Anh Nguyen
Juan Castiñeiras
Naz Belkaya
Sofia Freitas
(Co-Sup. J. Paton)
Tiago Costa
(Co-Sup. G. Polavieja)

Technician
Ricardo Monteiro

How do animals use sensory information to guide their decisions? In addition to using their sensory systems to specify the relevant states of the environment, a large number of processes are important for implementing adaptive decision-making. These include the ability to accumulate evidence across time, develop measures of sensory uncertainty, and mechanisms for executing all-or-none commitments to a given course of action. More generally, decision-making also relies on motivational factors mediating the propensity to act in order to accomplish goals, and on the dynamic allocation of cognitive resources to the decision task at the expense of other behaviours. We study these problems using behavioural analysis, neural recordings and perturbations from rodents performing simple perceptual decision-making tasks in reduced environments. Our goal is to use these experiments to design testable mathematical theories describing the brain and behaviour during decision-making.

Last year was quite successful for us. We published two high-impact publications (Cazettes et al., Curr. Biol. & Steinmetz et al., Science), and two bioarchive papers (Reato et al., bioRxiv & Cazettes et al., bioRxiv). Our FCT grant application received the second best score in Portugal in the Neuroscience Panel, and one of our PhD students, Naz Belkaya, got the fourth best score in Portugal on the Biomedicine Panel of the FCT call for PhD fellowships. ■

Behaviour & Metabolism

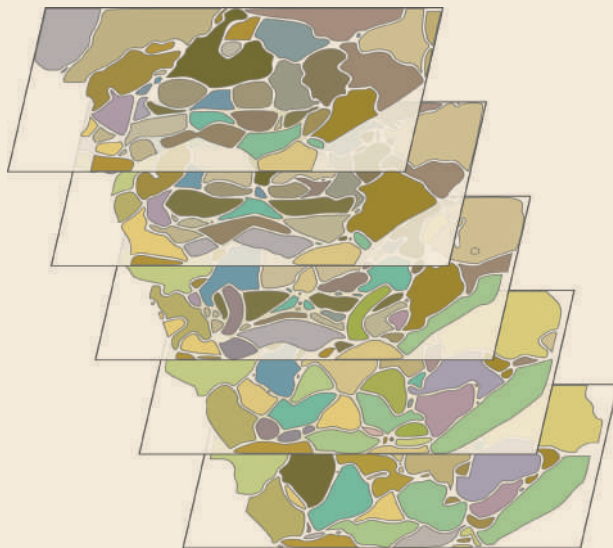
How does diet shape brain function, behaviour, and physiology.

Methods

Neuronal circuit manipulations, High throughput, Automated, quantitative behavioural assays; Volumetric calcium two photon imaging; Genome engineering (CRISPR) and RNAi screens; Isotope resolved metabolomics; scRNAseq

Model Organism

Fruit fly



The SEZ is the region of the fly brain that receives the majority of taste sensory inputs and houses the motor neurons that control feeding. Since this region consists mainly of neural fibres (neuropil), its substructure is not well-defined anatomically. In this study, we performed 3D neuropil imaging and computational analysis in different internal states (fed, nutrient-deprived, mated, virgin) and with different tastants (sucrose, yeast, water). This approach uncovered a functional atlas of the SEZ representing distinct neural response patterns to each state.

Ribeiro Lab

Principal Investigator
Carlos Ribeiro



Postdoctoral Researchers
Daniel Münch
Darshan Dhakan
Gili Ezra
Ibrahim Tastekin
Raquel Barajas
Sílvia Henriques
Zita Santos

PhD Students
Dennis Goldschmidt
Patrícia Francisco
Rita Figueiredo
Rory Beresford

Technicians
Ana Paula Elias
Célia Baltazar
Inês Haan de Vicente

The food we eat affects all aspects of our lives, including ageing, ability to reproduce, lifespan, mental state and mood. For better or worse, we are what we eat. Yet, how dietary nutrients affect brain function and how the brain controls food choice is still a mystery. What are the neural processes that drive us to choose a pretzel over an apple, or a steak over ice cream? To tap into this problem researchers have to tackle difficult questions such as “how does the brain know which nutrients the body needs?” and “how is this information translated into decisions?” We address these questions using the fruit fly *Drosophila melanogaster*, one of the most powerful and versatile genetic animal models currently available. The fly allows us to combine a wide array of tools and approaches, which include, genetic circuit manipulations, activity imaging, automated, quantitative methods for studying behaviour, microbiome manipulations, and tissue specific large scale RNAi screens. Team members use this wide array of approaches since it enables us to implement an integrative neuroscience approach, necessary to solve this whole-organism problem.

ribeirolab.org

We published studies on two fundamental questions in biology (Münch et al., & Li et al.,). To answer how nutrient deprivation changes brain function, we developed a novel microscopy approach to observe all neurons in the fly brain during feeding. Using this tool, we investigated neural activity under different conditions, such as different diets and pregnancy, and were struck to find that lack of proteins changed activity in about 50% of the brain, explaining how and why flies change their food preference when deprived of specific nutrients. In the second study, we teamed up with over 200 international colleagues to build a cell atlas of the adult fly. By working together, we discovered what many of the cells do, how they build organs together, and maintain life and reproduction. This project was an uplifting experience, demonstrating yet again that one of the greatest assets of fly-work is the community's shared spirit of discovery that has shaped the field for over a century. ■



Research Associates

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

Ruth Diez del Corral Development of Neural Circuits

Associated with the Mathematics
of Behaviour & Intelligence
and the Vision to Action labs

The formation of neural circuits with specific functions in the brain, requires the generation of neurons with appropriate subtype identities and the establishment of the right connections. We are interested in understanding how these circuits are assembled during development and for this, we are collaborating with the Orger lab in the anatomical and developmental characterisation of neuronal subpopulations involved in visually guided behaviors in zebrafish. We are focusing our work on the diencephalon, a brain region which contains important neuronal nuclei involved in the processing of sensory stimuli and in the distribution of neuronal signals to other brain areas, including those that act as effectors of behaviours, such as the motor output.

Maria Luisa Vasconcelos Innate Behaviour

Postdoctoral Researcher: Cecilia Mezzera
PhD Students: Cristina Ferreira,
Eliane Arez, Miguel Gaspar
Technician: Sophie Dias

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

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-the-art 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 Machens lab, we develop and apply analysis tools to understand what type of information is carried by populations of neurons. We hope to understand how different circuits in the brain contribute to the processing of these different types of motion, from sensation to selection of a behavioural response.

Eric DeWitt Computational Cognitive Decision Science

Associated with the Systems
Neuroscience lab

Our team uses computational models to describe learning and decision-making behaviour in humans and animals, and then uses these models to investigate their implementation in the brain and inform future AI research directions. Using this approach, we aim to understand the brain areas that help humans and animals make decisions and learn about their world. Our specific focus is on the role of neuromodulators, known to play key roles in learning and decision-making, and how their activity informs and changes computations in downstream brain areas. We hope that a better understanding of these brain systems and their role in decision-making will eventually inform models of human economic and political behaviour and help our understanding of psychiatric disorders.

Adjunct & Visiting Scientists

In addition to research labs located at the Champalimaud Centre for the Unknown, CR also counts with adjunct and visiting scientists, who work on complementary research areas.

Adam Kampff Intelligent Systems

Affiliation: University College London

Our goal is to identify the general principles of brain function that support intelligent behaviour and to implement them in machines. Specifically, we focus on how the brain constructs a representation of the environment: How is this representation learned? How is it encoded in the activity of neural networks? How is it used to control adaptive behaviour?

Rui Oliveira Social Neuro Endocrinology

Affiliations: Instituto Gulbenkian de Ciência, ISPA – Instituto Universitário

We are interested in understanding the neuroendocrine mechanisms of social behaviour and how the social environment may feedback on the neuroendocrine system. In particular we are interested in the role of hormones as key physiological mediators underlying social plasticity.

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 3 months after stroke.

Cancer Dormancy & Immunity

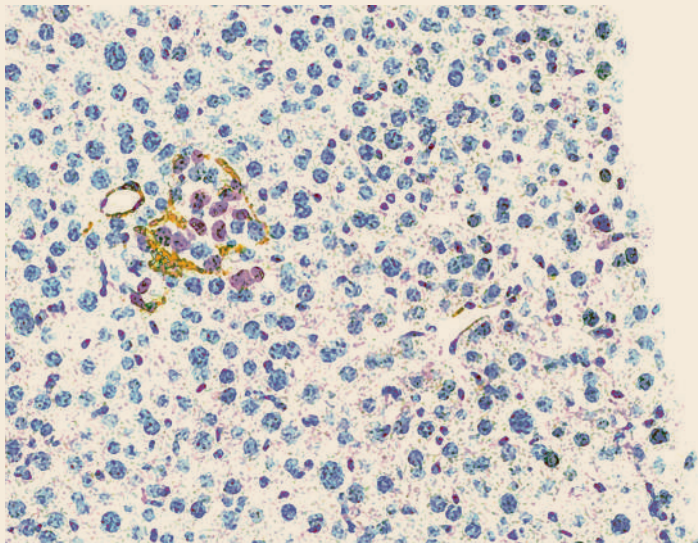
Our laboratory is interested in understanding what brings disseminated tumour cells in and out of dormancy, and how these dormant cells can be targeted.

Methods

Cell and molecular biology techniques, Genetic engineering, Imaging, Multicolour flow cytometry, Single cell and spatial transcriptomics

Model Organism

Mouse models and culture-based tissue mimetics, and ultimate validation in human tissues



Non-dividing breast cancer cells (purple) that broke away from the primary tumour and found residency in the mouse liver, where they remain dormant one year after primary tumour resection.

Correia Lab

Principal Investigator
Ana Luisa Correia



The Correia lab joined the Champalimaud Foundation on December 2021.
Welcome Ana Luisa Correia!

We study metastasis, the process in which cancer spreads beyond the primary tumour site and emerges in other parts of the body. Metastases continue to cause the vast majority of cancer-related deaths. In many cancer patients, metastases emerge long after successful treatment of the primary tumour. This is so because persistent disseminated tumour cells (or DTCs) find residency at distant sites under a state of dormancy, only to awaken years or even decades afterwards and initiate metastases. This pause in cancer progression is a singular therapeutic window to intervene against future deadly metastases. We centre our efforts in studying the dormancy challenge in breast cancer, which most often spreads to the bones, liver, lung, brain and lymph nodes. We aim at dissecting the interactions of DTCs with the unique microenvironment in each distant site, thus providing a roadmap of tissue-specific vulnerabilities that may be explored therapeutically. Because immune cells in tissues are first responders to tissue damage and invading DTCs, we are particularly interested in defining how tissue immunity shapes metastatic progression. Using multiple complementary approaches, we strive to develop strategies to prevent metastases from ever emerging.

In 2021, I built a tool to track dormant cancer cells in living organisms, and discovered a role for natural killer (NK) cells in keeping those asleep. This study was published in Nature, and granted me the Pfizer Oncology prize in Switzerland.

I also received the Metastasis Prize from the Beug Foundation, a seed fund that will allow us to explore a new frontier on how neuro-immune cell interactions influence metastatic progression.

I am elated to have joined the CF community and launched my research group within the Physiology & Cancer Programme in December 2021. I look forward to welcoming the first team members, kick-starting our research, and fostering collaborations with colleagues from the Research and Clinical Centre. ■

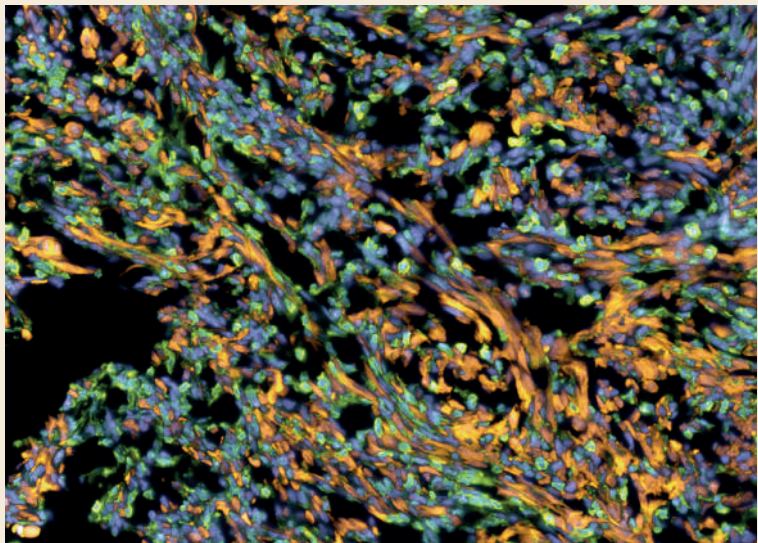
correialab.com

Systems Oncology

Our group focuses on identifying new or poorly understood biological functions of extracellular vesicles in cancer.

Methods
Vesicles Flow
Cytometry,
Mouse tumour models

Model Organism
Mice



Infiltration of white blood cells called leukocytes (CD45, green) in pancreatic tumour masses (MCherry, orange) mediated by extracellular vesicles. (DAPI is blue marks all cell nuclei in the tissue.)

Costa-Silva Lab

Principal Investigator
Bruno Costa-Silva



Postdoctoral Researchers
Ana Gregório
Inês Coelho
Joana Maia
Maria Carolina Strano Moraes
Sílvia Baptista

PhD Students
Joana Maia
Julia Elzanowska
Nuno Couto

Technicians
Beatriz Sebo
Cristian Bodo
Melanie Aguiar

Little is known about how Extracellular Vesicles (EVs) acquire the molecules that are located on their surface (through interactions after secretion), and how these interactions modulate the bio-availability and activity of pro- or anti-tumorigenic proteins, produced locally or systemically. We aim at identifying how EV protein interactions regulate cell signalling, tumour progression, cancer immunity and response to immunotherapies.

Our research group has developed methods to study protein interactions of EVs (unpublished data) and *in vivo* models to study their role in tumour biology. ■

Cell Fitness

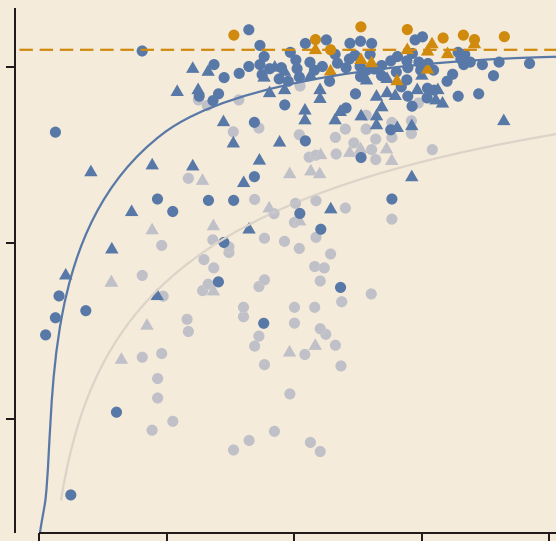
Intercellular communication of cell fitness in development, cancer and ageing.

Methods

Genetics, Microscopy,
Molecular biology,
Transcriptomics,
Biophysics

Model Organism

Fruit flies, Mice, Humans



Flower lose, a cell fitness marker, predicts COVID-19 prognosis, including the risks of hospitalisation (blue) and death (yellow).

Figure adapted from Yekelchik et al., EMBO Mol Med.

Moreno Lab

Principal Investigator
Eduardo Moreno



Postdoctoral Researchers

Ana Cristina Queirós
Catarina Brás Pereira
Dina Coelho
Esha Gogna
Mario Aguilar

PhD Students

Andrea Spinazzola
Andrés Gutiérrez
António Palma
Catarina Costa
Denise Camacho
Maria Bettencourt
Maria Carolina Rodrigues
Mariana Reis
Miguel Pinto

MSc Student

Maria Leonor Peixoto

Technicians

Joana Couceiro
Marta Avelar

We are interested in how cells in our bodies interact and exchange information during normal physiology and disease. In particular, we are interested in processes in which cells stop cooperating and start competing with each other. This competition is important because it is found in several diseases, including cancer and neurodegeneration. In 2021, we have also found that it is important during COVID-19 infection, especially among infected individuals with higher risk of hospitalisation or death.

During 2021, we evaluated whether hFwe-Lose gene expression can outperform conventional methods in predicting death and hospitalisation in COVID-19 patients. We performed a post-mortem examination of infected lung tissue in deceased COVID-19 patients and performed an observational study to evaluate whether hFwe-Lose expression (in nasopharyngeal samples) could accurately predict hospitalisation or death in COVID-19 patients. We found that the cell fitness marker, hFwe-Lose, accurately predicts outcomes in COVID-19 patients. This finding demonstrated how tissue fitness pathways dictate the response to infection and disease and their utility in managing the current COVID-19 pandemic. Because risk stratification of COVID-19 patients is essential for pandemic management and changes in the cell fitness marker, hFwe-Lose, can precede the host immune response to infection, such a biomarker can be used as an earlier triage tool. ■

moreno-lab.org

Stem Cells & Regeneration

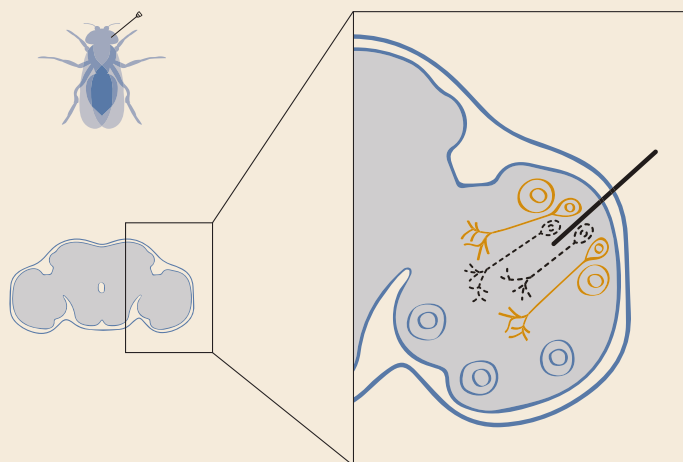
We are interested
in injury-induced
brain plasticity.

Methods

Lineage-tracing,
Genetics,
Transcriptomics,
Confocal imaging,
Behavioural assays

Model Organism

Fruit flies



The brains of fruit flies (and mammals) contain neural stem cells in a reversible state of dormancy (quiescence). Expression profiling and genetic tools available in fruit flies allow us to decipher the molecular basis of how quiescent neural stem cells sense tissue damage and can be stimulated to promote regeneration in response to local brain injury. Our lab has discovered important neuro-glial clusters, which promote the engagement of stem cells in the vicinity of a brain lesion via secreted factors.

Rhiner Lab

Principal
Investigator
Christa Rhiner



Postdoctoral
Researcher
Marta Neto

PhD Students
Anabel Rodriguez
Simões
Margarida Caio
Mariana Santos

MSc Student
Maria Baginha

Technician
Carolina Alves

Intern
Paulo Ávila

We are studying how adult neural stem cells integrate cues from the tissue environment, which regulate their activity. The mammalian brain contains neural stem cells, which reside in a reversible state of dormancy, also called quiescence. Tissue damage can trigger activation of such quiescent stem cells, but the process is inefficient in the brain. Moreover, there are currently no treatments available that can promote regenerative processes in the brain following injury.

Apart from the recruitment of neural stem cells, we also investigate how newly formed cells (neurons, glia) contribute to brain repair. To understand the underlying genetic and molecular basis of these processes, which are still not well understood at the mechanistic level, we use a genetically versatile fruit fly model, in which traumatic brain injury also leads to activation of dormant neural progenitor cells. We use a combination of transcriptional profiling (injured brain or sorted cell types) and *in vivo* RNAi knock-down of large sets of candidate factors to identify essential stem cell activating signals. In our fly model, we can then manipulate the function of a promising target with high temporal and cell-type specific resolution to monitor the impact on cell fate (lineage tracing), tissue regeneration up to behaviour. Since the beginning of 2021, we are also collaborating with labs working on brain injury models in rodents to explore the conserved nature of the identified mechanisms of brain repair.

In 2021, we finished a manuscript on a novel inter-cellular communication circuitry that is critical to the understanding of stem cell biology and brain damage and launched the experiments for the revision. We also welcomed Paul Avila from Santiago de Compostela, who has worked for his PhD on the effect of hypothermia on stroke treatment in mice and who set out to establish a fly model to compare his findings. Maria Caio successfully defended her Master thesis and Mariana Santos presented her findings at the Portuguese Drosophila meeting and handed in the written part of her PhD thesis. Finally, I presented the results on the newly discovered neuro-glial communication circuit at the meeting of the Spanish Neuroscience Society in Lleida, a very stimulating conference, which after several delays could be run as a presencial event. ■

rhinerlab.org

Cancer & Stem Cell Biology

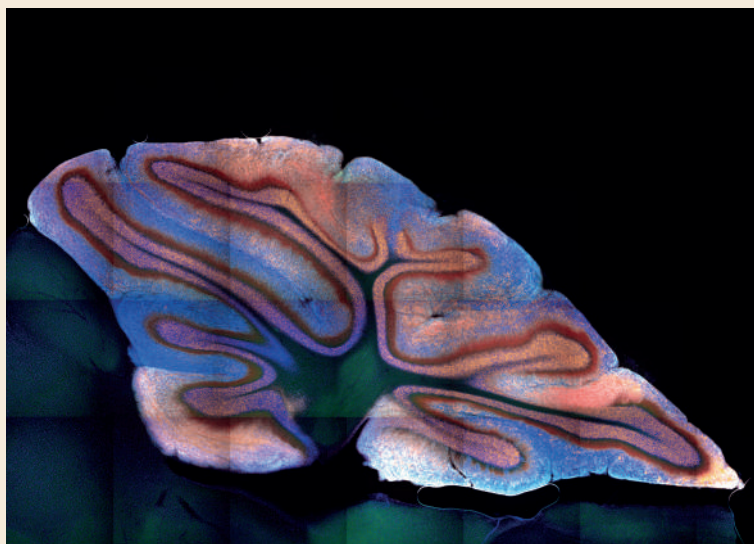
Uncovering the differences and similarities between paediatric and adult cancers.

Methods

Genetic mouse models of cancer, 3D cell culture systems, Tissue clearing, Lineage tracing, Microscopy

Model Organism

Mice, Human samples



Section of a mouse cerebellum bearing a medulloblastoma, the most common paediatric brain tumour.

Sánchez-Danés Lab

Principal Investigator;
ERA Chair Holder
Adriana
Sánchez-Danés



Senior Researcher
Patricia Borges

Junior Researcher
Raquel Soares

Postdoctoral
Researchers
Adán Salas
Sandra Blasco
Sara Canato

PhD Students
Ana Sofia Marques

MSc Students
Andrea Moreno
Erik Cardoso



Paediatric cancers have been reported to be distinct from adult cancers in terms of their epidemiology, biology and response to therapy. However, the reasons accounting for these differences are not well understood. From a developmental perspective, paediatric cancers arise during development, when tissues are in expansion. In contrast, cancer in adults develops from tissues that have reached homeostasis. This suggests that cancers in adults and children arise from different cellular dynamics, but can these differences in the cellular dynamics of the tumour-initiating cells explain the distinct biology of paediatric and adult cancers? Do the changes in the microenvironment that take place from development to adulthood shape tumour initiation, progression and metastasis? In the lab, we aim to uncover these questions by exploring to what extent the cellular composition and interactions of the tumour cells and the microenvironment evolve across development to adulthood, thereby shaping paediatric and adult tumour initiation and progression. To this end, we use a multidisciplinary approach combining *in vivo* and *in vitro* experiments. The identification of the differences in the biology of paediatric and adult cancers will provide the basis to understand a key question in the clinical field: whether the differences observed in the response to cancer therapy between paediatric and adult patients are due to differences in their biology.

This year the first PhD student of the lab and a talented postdoc have joined the lab: welcome Ana Sofia Marques and Sara Canato! We would like to congratulate Erik Cardoso, the first Master's Student of the lab, who has successfully defended his Master thesis! We are also really excited about an initiative that we had started last year called "Ciencia di Noz Manera/ Scientists as role models". This initiative's aim is to encourage students from underprivileged neighbourhoods in Lisbon to go to university, and preferably study STEM disciplines, by recruiting researchers as mentors and potential role models. The initiative was supported by CF and the QuantOCancer project. This first edition was a success, as the students found the interactions with the researchers extremely interesting and insightful. We would like to thank all the volunteers from CR that joined us. Without their help it would not have been such a success! ■

fchampalimaud.org/research/groups/sanchez-danes

Immunophysiology

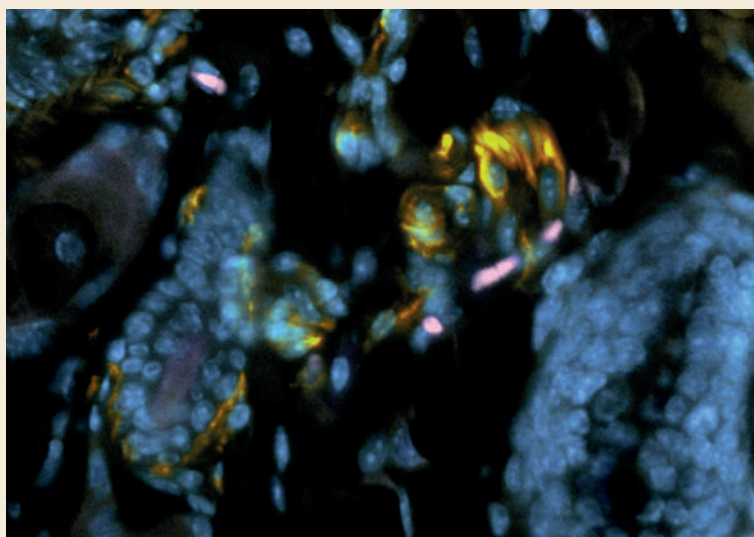
Neuroimmune interactions in the prevention and resolution of disease.

Methods

Genetically tractable organisms, Flow cytometry, Cellular biology, Molecular biology, Imaging

Model Organism

Mice



Adrenergic neurons of the peripheral sympathetic nervous system (yellow) modulate the function of dendritic cells (pink) in the skin. (Blue marks all cell nuclei in the tissue).

Veiga-Fernandes Lab

Principal Investigator
Henrique Veiga-Fernandes



Postdoctoral Researchers
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David Brea-Lopez
Maria Aliseychik
María Martínez
Marko Sestan
Roeland Wolterink
Roksana Pirzgalska

PhD Students
Ana Filipa Cardoso
Ana Rasteiro
Kristin Fischer
Miguel Rendas
Raquel Silva

Technicians
Bruno Raposo
Inês Godinho

Admin Support
Hélder Ribeiro

Visiting Researchers
Manuela Ferreira
Patrícia Bastos

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. We have discovered that while the immune system is the one that actively fights infection and cancer, the neurons are the ones that are in charge of detecting the invasion of tumour cells and setting the immune response in motion. These findings may have tremendous potential for designing novel therapeutic approaches for disease, as they pinpoint new selective targets that can be harnessed in infection, metabolic disorders and cancer.

Our team deciphered how neuroimmune interactions burn deep fat. This study offers new therapeutic avenues for reducing visceral fat stores, which have been associated with cardiovascular disease and multiple types of cancer (Cardoso et al., Nature 2021). Limm Therapeutics, a CF start-up company based on the pioneering work of the team, was selected for the largest-ever funding round of the European Innovation Council (EIC) Accelerator programme for life science biotech in the country. The company received 12.5M€ for the development of immunotherapy drugs. ■

veigafernandeslab.org

Molecular & Experimental Pathology

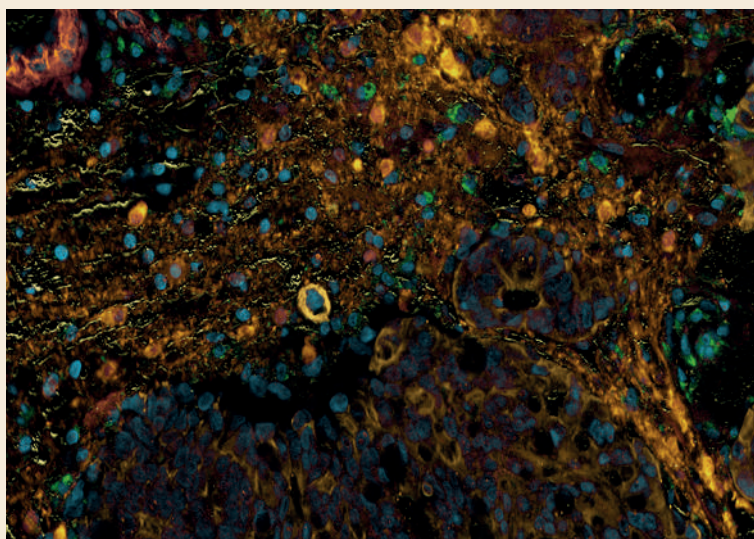
Identification of molecular signatures in neoplastic cells and characterisation of immune infiltrates in different carcinomas with the aim to develop novel therapeutic options.

Methods

Histopathology,
Multispectral
microscopy, Spatial
immunofluorescence,
Flow cytometry,
Cell culture

Model Organism

Humans



Multiplex immunofluorescence of a metastatic carcinoma in the brain, used as a positive immunofluorescence control for the project developed by Sara Cascais in collaboration with Carracedo's Lab at the CIC bioGUNE, Bilbao, Spain.

Castillo-Martin Lab

Group Leader
Mirela
Castillo-Martin



Associate Researcher
Javier Martín

PhD Student
Andreia Maia

MSc Students
Ana Borralho
Cátia Rebelo
Hasti Calá
Sara Cascais

The research performed in our lab is based on the study of molecular signatures in human cancer tissue both on neoplastic cells as well as on the tumour microenvironment focusing on tumour infiltrating immune cells, with the final goal of understanding the role of specific immune cells in anti-tumour activity for developing efficient cell-based therapeutic approaches. To fulfil this aim, we use multispectral microscopy and spatial immunofluorescence to characterise tissue specimens from different types of human solid neoplasms and correlate the histological findings with clinico-pathological data.

The lab has been well represented scientifically, since our four students presented the data of their Master's thesis and PhD projects in several congresses. These include the 27th Porto Cancer Meeting "Stemness & Metastasis: Advances in Research and Clinical Translational", the 16th Young European Scientist (YES) Meeting: Igniting the Future!, and the II ASPIC-ASEICA International Meeting – Current Trends in Precision Medicine in Cancer. Andreia Maia, a PhD student in the lab also presented part of her PhD thesis project in three international meetings: the EACR Virtual Conference on Defence is the Best Attack, the AACR Virtual Special Conference – Tumour Immunology and Immunotherapy, and the Society for Immunotherapy of Cancer's (SITC) 36th Annual Meeting. ■

fchampalimaud.org/research/groups/castillo-martin

Radiopharmacology

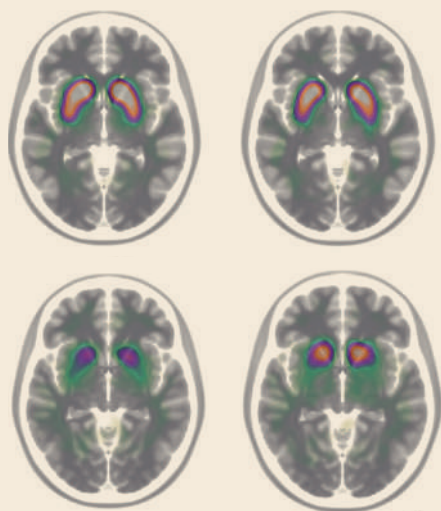
To use radiopharmaceuticals to promote better diagnoses, improve prognostication with new biomarkers and develop new treatments to achieve better outcomes for patients.

Methods

Image processing and quantification, Development of imaging biomarkers and their extraction, Use of statistical methods and Machine Learning, Development of new radiopharmaceuticals for diagnosis and treatment

Model Organism

Humans



The aim of this study was to investigate whether Dementia with Lewy Bodies could be differentiated from Alzheimer's and Parkinson's Disease with clinical imaging techniques. Quantitative analysis of the radiopharmaceutical ^{123}I -FP-CIT in SPECT scans revealed a clear distinction between these conditions.

Figure relates to: Oliveira et al., J Neurol Neurosurg Psychiatry.

Costa Lab

Group Leader;
Director of Nuclear Medicine Services
Durval Costa



Mathematician
Francisco Oliveira

Physicists
Mauro Costa
Paulo Ferreira
Rui Parafita

Radiopharmacist
Ana Capacho

Nuclear Medicine Physicians
Ângelo Silva
Carla Oliveira
Joana Castanheira
Ricardo Teixeira
Sofia Vaz

Biomedical Engineer
Cláudia Constantino

Nuclear Medicine Technicians
Ana Canudo
Bárbara Freitas
Helena Delgado
Juliana Correia
Mariana Silva
Marisa Machado
Miguel Andrade
Rita Oliveira
Sónia Teixeira
Vanessa Vieira

PhD Students
Gabriela Ribeiro
Jorge Borbinha
Sara Ferreira

MSc Students
Ana Mara Fonseca
Mariana Silva
Maria Inês Gonçalves
Maria Inês Ribeiro
Miguel Andrade
Natacha Valador
Rita Oliveira

Nuclear Medicine-Radiopharmacology is a medical specialty that uses molecules labelled with radionuclides (radiopharmaceuticals) in the diagnosis and/or treatment of diseases. The radiopharmaceuticals help, *in vivo* and non-invasively, to depict specific cellular functions and their abnormalities that are characteristic of the disease processes. A good diagnosis and prognosis may be achieved with just visual assessment and standard quantification of the radiopharmaceutical distribution in the organs/tissues of interest. However, this is often insufficient. For that reason, we are working hard on the development of new quantitative approaches following improved image processing analysis. When radiopharmaceuticals are used for treatment, in order to achieve an adequate therapeutic effect, it is paramount to estimate as accurately as possible the amount of radiation to be administered to the tumour/patient aiming at the destruction of the tumour cells. However, one must at the same time, and to preserve the vital/normal organs/tissues from the effects of radiation, to minimise unwanted and deleterious secondary effects.

We highlight our new radiopharmacy. Soon, we will be able to produce/synthesise new radiopharmaceuticals under Good Manufacturing Practises (GMP) quality and certification. We believe this will have a significant impact on clinical service and research endeavours.

Also, in 2021, Paulo Ferreira, a physicist on the team, took part of the Dosimetry Task Force of the Society of Nuclear Medicine and Molecular Imaging (SNMMI). Finally, I have become an Emeritus Reader at the University College London, UK. ■

fchampalimaud.org/research/groups/durval-costa

Cancer Development & Innate Immune Evasion

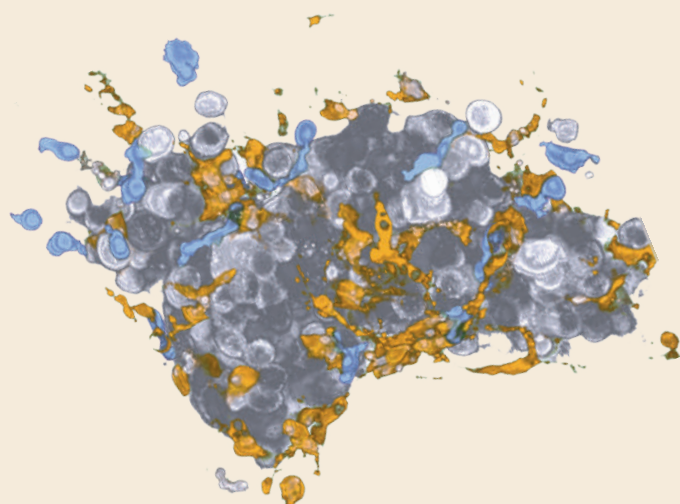
Our lab uses the Zebrafish Avatar model as a platform for personalised medicine and discovery of innate immune mechanisms and modulators for cancer immunotherapy.

Methods

Zebrafish xenografts, Immunofluorescence, Confocal and lightsheet microscopy, Single-cell RNA sequencing

Model Organism

Zebrafish



Dynamic interactions between human tumour cells (white), macrophages (yellow) and neutrophils (blue).

Fior Lab

Group Leader
Rita Fior



Lab Manager
Bruna Costa

Postdoctoral Researchers
Marta Estrada
Raquel Mendes

PhD Students
Ana Beatriz Machado
Mayra Martinez
Vanda Póvoa

MSc Students
Filipa Amorim
Marcia Fontes

Technician
Cátia Almeida

With the exception of a few biomarker-driven therapies, most patients are treated with chemo or radiotherapy and often go through rounds of trial-and-error approaches to find the best treatment. Our lab focuses on developing a fast *in vivo* assay with unprecedented cellular resolution – the zebrafish xenograft model (zAvatar) for personalised medicine. This assay relies on the injection of tumour cells into two-days post fertilisation embryos, and assessment of tumour behaviour and response to therapy after four days. zAvatars offer speed, high cellular resolution, and allow evaluation of crucial hallmarks of cancer, such as metastatic and angiogenic potential. Our Lab also investigates the cellular and molecular interactions that occur between human tumour cells and zebrafish innate immune cells. Our goal is to understand these processes and use the zebrafish xenografts to discover new therapies to be combined with immunotherapy.

We published a study in Nature Communications, (Póvoa et al., 2021), titled “Innate immune evasion revealed in a colorectal zebrafish xenograft model.” This publication is a landmark in the lab and in our field of research. The process of cancer immunoediting results from a dynamic battle between tumours and the host immune system. In the end, the tumour is either eradicated by the immune system, or it can develop strategies to evade and corrupt the immune system, thereby helping the cancer to thrive in the host. In this study, we took advantage of the zebrafish larvae xenograft model to investigate the contribution of innate immunity to this process. We found that just like zebrafish xenografts can be used as reporters for angiogenesis, they can also disclose the innate tumour microenvironment state. In other words, our hypothesis is that zAvatars can reveal whether the tumour can generate an anti-tumoural (immune permissive/hot) or pro-tumoural (immune suppressive/cold) tumour microenvironment. ■

fchampalimaud.org/research/groups/fior

Myeloma Lymphoma Research

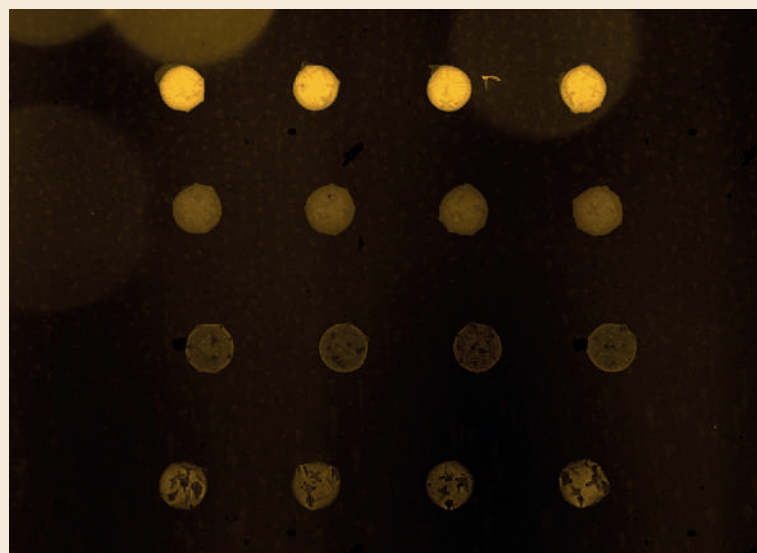
Discovery of new methods for disease characterisation and new therapeutic strategies in multiple myeloma and lymphoma.

Methods

Next generation flow, Next generation sequencing, Mouse models, Cell culture, Proteomics

Model Organism

Mice, Humans



A multiplexed antibody array quantifying proteins of extracellular vesicles, purified from a blood sample of a multiple myeloma patient. Each of the four lines corresponds to specific proteins, and each column is a replica of the same protein. (Replicas are used to average the intensity of repeated measures to obtain the mean level of expression of each protein).

João Lab

Group Leader
Cristina João



Postdoctoral Researchers
Ana Queirós
Emilie Carneiro

MD Student
Alexander Marta

PhD Students
Bruna Ferreira
Filipa Barahona
Raquel Lopes

MSc Students
Carolina Pestana
Diana Lourenço

BSc Student
Teresa Rosa

Multiple myeloma and lymphoma are haematological cancers requiring better tools for diagnosis and prognosis determination, as well as more efficient treatments. Our group is interested in: 1) identifying new methods for disease characterisation; 2) developing *ex vivo* models for personalised drug screening; and 3) discovering new drug targets. To this end, we pursue the following translational projects:

As members of the European Consortium “Euroflow”, we aim to identify novel biomarkers of disease and prognosis by studying chronic lymphocytic leukaemia B cells with liquid biopsies.

With the Costa Silva lab, we’re developing a whole-body imaging tool for tumour assessment.

With the Sánchez-Danés lab, we are developing a personalised drug testing system where patients’ bone marrow cells are cultured to produce 3D structures mimicking the tumour microenvironment.

With the Fior lab, we are exploring zebrafish avatars of chronic lymphoid leukaemia to develop a new *in vivo* screening platform for anti-cancer drugs.

We are characterising the immune microenvironment alterations involved in multiple myeloma, using single cells sequencing studies and immunophenotyping characterisation to identify new drug targets.

Finally, as a new axis of research, we are exploring the peripheral nervous system as a potential new therapeutic target in multiple myeloma, in collaboration with Roel Klein Wolterink.

In 2021, our research group was consolidated into Champalimaud Research. We received a 250,000€ grant from the Fundação para a Ciência e a Tecnologia (FCT). Raquel Lopes and Filipa Barahona, two PhD students of the group, were awarded PhD fellowships from FCT as well. Carolina Pestana defended her Master’s thesis with great success and merit and is continuing her work as a mathematician and statistician in our group. The team welcomed a new Master’s student, Diana Lourenço. Finally, Bruna Velosa Ferreira completed her PhD project, and her public PhD defence is planned for March 2022. ■

fchampalimaud.org/research/groups/joao

Immunotherapy / Immunosurgery

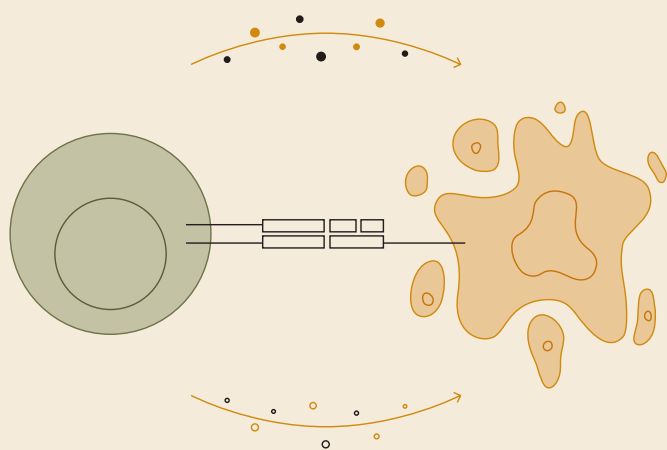
The robust and reliable expansion of tumour-reactive tumour-infiltrating lymphocytes from patients with pancreatic cancer.

Methods

Cell culture, RNA & DNA sequencing, Flow cytometry, Cell-cell interaction analysis, Computational techniques, Live cell-cell imaging

Model Organism

Ex vivo human tissue material



Tumour-infiltrating lymphocytes reacting against cancer cells.

Maeurer Lab

Group Leader
Markus Maeurer



Postdoctoral Researchers
Carolina Gorgulho
Joana Lérias

Pharmacist
Bernardo Marinheiro

Quality Control Manager
Cristina Afonso

Bioinformatician
Eric de Sousa

MSc Students
Jéssica Kamiki
Patrícia António

Technicians
Ana Carolina Condeço
Georgia Paraschoudi
Pedro Noronha de Castro Machado
Teixeira
Rodrigo Eduardo
Sara Cascais
Ulisses Gaspar

Tumour-infiltrating lymphocytes (TIL) are immune cells that may be able to specifically recognise cancer cells, and thus could potentially be exploited for cancer immunotherapy. The advent of increased pancreatic cancer surgery with Prof Markus Buechler at the Champalimaud Clinical Centre has given us access to clinically relevant tissue. Consequently, it has allowed us to implement a new TIL expansion protocol from almost every pancreatic cancer lesion to harvest numbers of TILs that could later be used for the adoptive therapy for patients. This preclinical development allowed us to demonstrate that an orchestrated cellular immune response exists in pancreatic cancer lesions, that these immune cells can be expanded *ex vivo* and prepared for later, potential clinical use. In order to streamline this process, we have been working on the identification of a more 'automated, hands-off' solution that will also allow the genetic manipulation of immune cells (the 'Cocoon system').

A major effort was made to capture the immune expansion protocols in a GMP ('Good manufacturing') compliant fashion in preparation for the future Botton-Champalimaud Pancreatic Cancer Centre GMP facility setup. Furthermore, the combination of T-cell receptor sequencing and the identification of the mutated proteins which the same receptors target, resulted in a number of patents, which are currently under submission. In 2021, we also undertook several COVID-19-related efforts to help the local and international community to better understand SARS-CoV-2 immunopathology. The lab participated in several clinical trials and contributed to the successful expansion of the consortium Against Cancer and Infectious Diseases (initiated with Sir Alimuddin Zumla, UCL, UK), with a particular focus on the role of COVID-19 in patients with cancer. ■

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Neuropsychiatry

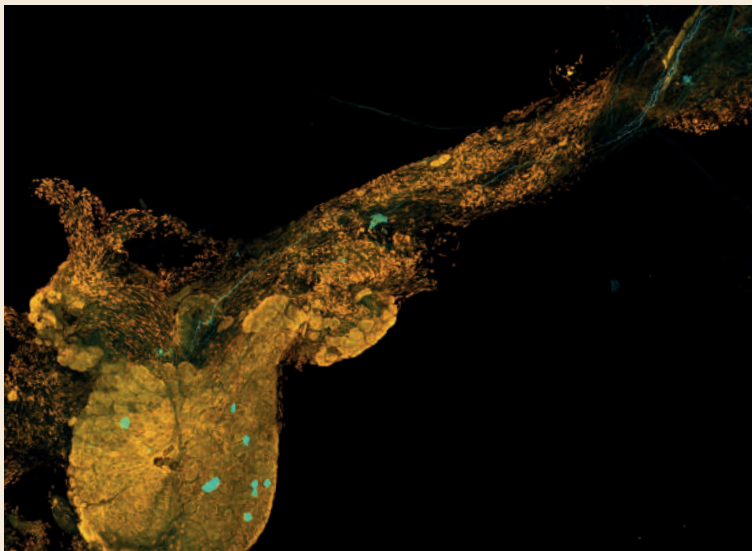
Cortico-striatal function in health, and dysfunction in disease, in the context of reward-related behaviours.

Methods

Calcium imaging, MRI, Psychological assessment, Behavioural assessment, Psychophysics

Model Organism

Mice, Humans



Some sensory signals resulting from ingested food are transmitted through the hepatic branch of the vagus nerve. This information is relayed to the brain through a structure of the peripheral nervous system called the nodose ganglion (in yellow). In this image, immunostaining of the left nodose ganglion, after viral injection of a green fluorescent protein at the hepatic hylus, shows green marked cell bodies and nerve fibres.

Oliveira-Maia Lab

Group Leader

Albino J. Oliveira-Maia



Postdoctoral Researchers

Ana Fernandes
Carolina Seybert
Joaquim Alves da Silva
Filipa Barros
Julia Queiroz
Raquel Lemos
Ricardo Matias

PhD Students

Ana Maia
Gabriela Ribeiro
Gonçalo Cotovio
Pedro C. Ferreira

MSc Student

Francisco Viana

Technician

Sofia Marques

Clinical Collaborators

Jaime Grácio
J. Bernardo Barahona-Corrêa
João da Fonseca
José Oliveira
Luzia Travado
Patrícia Pereira
Sílvia Almeida

The Neuropsychiatry Unit is a joint clinical and research unit, belonging both to the Champalimaud Clinical Centre (CCC) and to CR. The clinical arm of the unit is responsible for care in the areas of mental and cerebral health. We support patients with cancer treated at other units of the CCC, as well as others with disorders of mood, cognition or of the obsessive-compulsive spectrum. The research arm is a human and translational neuroscience laboratory working at the intersection between psychology, psychiatry, neurology and neuroscience. Currently, our main focus is centred on the drive to eat, as one of the strongest modulators of behaviour. Specifically we are interested in understanding the contribution of post-ingestive sensory information about energy content for the processes of food seeking, which we have been studying across several species and paradigms. In rodents, we use optogenetics and deep-brain calcium imaging, among advanced techniques for behavioural quantification, while in humans we use advanced behavioural, cognitive, brain imaging and neurostimulation approaches to study the mind and brain.

The lab has been developing a project on postingestive reinforcement in humans, for which we were awarded an ERC Starting Grant in the previous year. Lab members secured two grants, of close to 500k€, from the Portuguese Foundation for Science and Technology, for complementary studies on the central and peripheral mechanisms underlying this phenomenon in mice. Also, in 2021, the first results of the Neurocomp project, studying behavioural, immune and brain dysfunction in patients with obsessive-compulsive disorder, were presented at several international meetings. As a result of these presentations, Ana Maia was a winner of the 3 Minute Competition at the 20th WPA World Congress of Psychiatry, and was awarded the 2021 IOCDF Research Symposium Outstanding Poster Award by the International OCD Foundation; while José Oliveira received the 2021 Excellence Award from the European College of Neuropsychopharmacology. ■

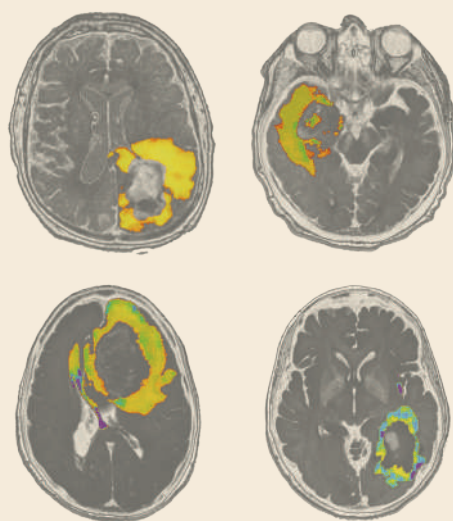
fchampalimaud.org/research/groups/oliveira-maia

Computational Clinical Imaging

To develop radiomics signatures and image processing tools based on deep learning models to detect, and characterise lesions, as well as to predict treatment response and to provide prognostic information in oncological patients.

Methods
Radiomics,
Machine Learning,
Deep Learning,
Image processing

Model Organism
Humans



Papanikolaou Lab

Group Leader
Nickolas
Papanikolaou



Postdoctoral Researcher
Karri Chiranjeevi

PhD Students
Ana Carolina Rodrigues
João Santinha
José Maria Moreira

Technicians
Ana Castro Verde
Miguel Chambel

The group is working with medical imaging data primarily, computing imaging features and through various machine learning methods, selecting the most informative answers to questions addressing the whole spectrum of oncologic disease continuum. The radiomic signatures we have developed so far focus on: a) the early detection of cancer (pancreatic cysts stratification); b) stratification of disease aggressiveness (prostate cancer); c) prediction of neoadjuvant treatment response (breast cancer), as well as methodological aspects like reproducibility of computed features (phantom studies), and more sophisticated causal feature selection methods (brain tumours). The datasets we use are based on bilateral collaborations with international clinical partners from the UK, France, Italy, Denmark, Sweden, Greece and Brazil.

ProCancer-I, an EU funded project, was the main focus of the group, since I coordinate several AI related activities within the project and assembled the local team, enriched with new hirings, to support the tasks that will be performed as soon as the first wave of data will become available in the centralised platform of ProCancer-I. One of the newcomers, Ana Carolina Rodrigues, published a research paper on predicting prostate cancer disease aggressiveness using radiomic features extracted from the whole prostate gland. This research will be verified in 2022 with big data from the ProCancer-I project and hopefully will be translated to clinics to facilitate medical teams to obtain important information at an early phase regarding biological aggressiveness of prostate cancer in a completely non-invasive way using only MRI images and the radiomic signature developed by CCIG. ■

fchampalimaud.org/research/groups/papanikolaou

Preclinical MRI

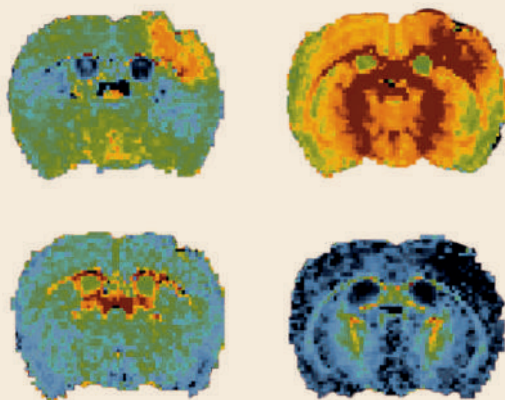
Harness ultrahigh field MRI to understand the mechanisms by which modifications in tissue microstructure transcend globally to modulate function and behaviour, and to explore the potential of these as early disease biomarkers.

Methods

MRI, Optogenetics, Electrophysiology, Histology, Intrinsic optical microscopy

Model Organism

Rodents (rats and mice), Chicks, Octopus, Fish, Humans



Microstructural changes three hours after ischemic stroke are detected with Correlation Tensor Imaging, showing great potential for resolving contributions of cytotoxic edema, neurite beading, and vasogenic edema, which until now were obfuscated in conventional MRI measurements.

Figure adapted from Alves et al., Neuroimage 2022.

Shemesh Lab

Principal Investigator;
Director of
Champalimaud
preclinical MRI
Centre (CMC)
Noam Shemesh



Postdoctoral
Researchers
Andrada Ianus
Cristina Chavarrías
Joana O. Carvalho
Rafael Henriques
Rui Simões
Sónia Gonçalves
Tal Shemesh

PhD Students
Frederico Severo
Rita Alves
Rita Gil
Ruxanda Lungu
Sara Monteiro

Technicians
Beatriz Cardoso
Francisca Fernandes
Renata Cruz

Clinical Research
Fellow
Carlos Bilreiro

Visiting Researcher
Joana Cabral

How can modulations in the microstructure of the nervous and cancerogenous tissues translate into degeneration, plasticity and recovery? To pursue this question, we combine cutting-edge ultrahigh field fMRI (9.4T and 16T) with orthogonal methodologies (optogenetics, electrophysiology, calcium recordings and histology) and microstructure modelling, in animal models of disease. This combination bridges the spatiotemporal scales necessary for repeatedly interrogating the locations and modes of neural/cancer activity and gain insight into their underlying biological mechanisms. Using these unique experimental set-ups we will achieve an in-depth, comprehensive understanding of the microstructural modifications underlying abnormal cell development and the dynamic balance between neuroplasticity and neurodegeneration at multiple spatiotemporal scales. Our research has tremendous potential for innovation in the healthcare and high-tech industries for establishing potential non-invasive MRI-based biomarkers of cancer and neurological diseases (such as Parkinson's, Alzheimer's, Autism and Schizophrenia). Our work also sheds light into the relationship between fMRI signals and the underlying neuronal activity. Deciphering fMRI origins is a particularly important goal for translational research and interpretability of fMRI human studies where BOLD fMRI is the method of choice to study the brain function.

shemeshlab.org

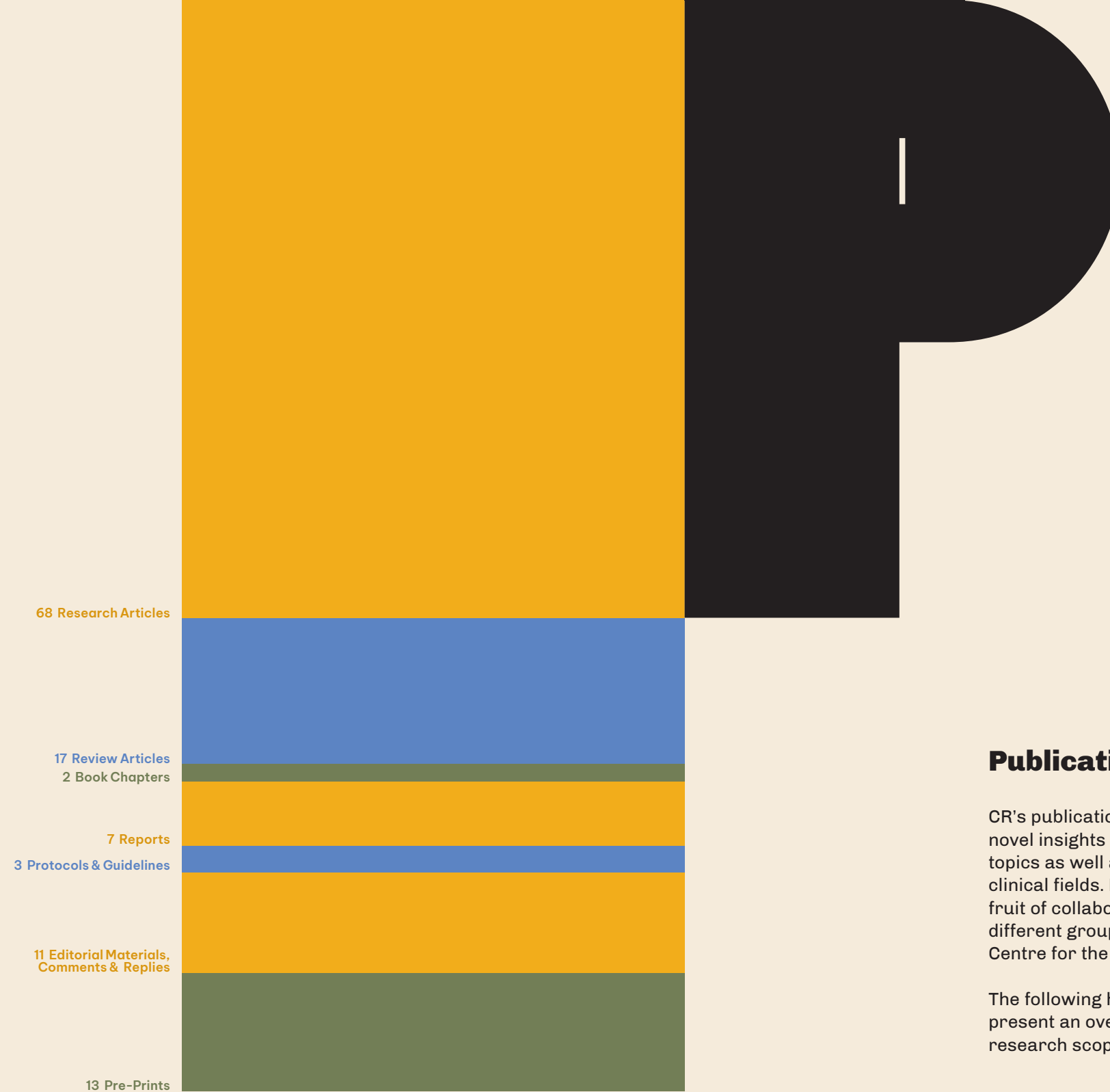
The lab was awarded research funds through several competitive calls. Santa Casa's Mantero Belard Award will support a project for deciphering the mechanisms underlying Parkinson's Disease by using a novel approach that combines genetics and advanced imaging techniques. Also, Joana Carvalho, a postdoctoral researcher in the lab, was awarded both a Marie Curie Fellowship and the 2021 L'Oréal Medal of Honour for women in science for mapping the dynamic interplay between stability and plasticity in the adult visual pathway. ■



Neural activity, eye and tail movements of a zebrafish larva are tracked simultaneously using advanced techniques.

Credit: Claudia Feierstein.





Publications

CR's publications during 2021 include novel insights into fundamental research topics as well as into translational and clinical fields. Many publications are the fruit of collaborative interactions among different groups within the Champalimaud Centre for the Unknown.

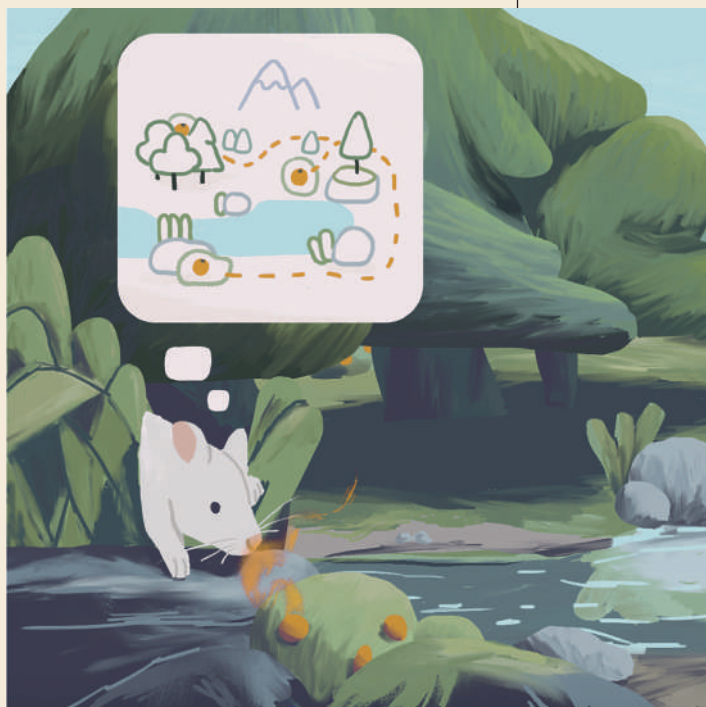
The following highlighted publications present an overview of CR's broad research scope.

Follow your nose

Smell has the power to transport us across time and space. It could be the sweet fragrance of jasmine, or the musty scent of algae. Suddenly, you are back at your childhood home, or under the burning sun of a distant shore.

This association between smells and places seems to be a deeply embedded aspect of human cognition. But how are the two linked in the brain? A study by the System Neuroscience lab presents a potential explanation with the discovery of neurons in the primary olfactory cortex of rats that link smells to places.

Poo et al., Nature. 2021.



Debunking the Prolactin Theory

A dominant theory in the field of reproduction and sexual behaviour claims that the hormone prolactin underlies the male post-ejaculatory refractory period, during which males are unable to engage in sexual activity.

A new study by the Neuroethology lab provides strong evidence against this theory and marks a new start for the search for the true underlying reason. In the long run, these new endeavours may provide insight into issues of sexual and reproductive dysfunction.

Valente et al., Communications Biology. 2021.

Biological marker predicts COVID-19 prognosis

During the COVID-19 pandemic, it had quickly become apparent that disease severity is tightly correlated with age. Age, however, is not the only factor. There are multiple cases of older people who were spared and younger individuals who died. A team of international scientists, including researchers of the Cell Fitness lab, decided to investigate the reason for that.

The team discovered that the levels of a protein that reflects the fitness of individual cells outperform all current biomarkers, including age, in predicting the severity of COVID-19 disease. This new marker can be assessed using the same procedure for COVID-19 diagnosis – performing a PCR test on samples collected with nasopharyngeal swabs.

Yekelchik et al., EMBO Molecular Medicine. 2021.

Sensitivity to sweet taste predicts the amount of weight loss that will be induced by stomach surgery to treat obesity

Scientists in the Neuropsychiatry Unit have discovered that measurements of food reward may be useful to identify, beforehand, which patients with obesity will achieve greater weight loss from surgery to treat obesity (a.k.a bariatric surgery).

This is an important step not only towards a more personalised evaluation of the potential efficacy of the procedure, but also towards understanding the biological mechanisms that underlie the effects of surgery and lead to weight loss.

Ribeiro et al., The American Journal of Clinical Nutrition. 2021.

Flies in a VR world reveal how vision affects locomotion

How do the visual and motor circuits of your brain interact to ensure that you walk in a straight course? In this study, scientists from the Sensorimotor Integration lab challenged a widely accepted explanation and proposed an alternative model.

While the dominant theory says that visual feedback triggers compensatory body rotations once you deviate from your trajectory, the team argued that these rotations happen far too quickly for that. Instead, their results suggest that vision is generating signals to prevent erroneous movements from happening in the first place, rather than correcting them after the fact.

Cruz et al., Current Biology. 2021.

Scientists develop a novel non-invasive MRI methodology that may allow unprecedented level of stroke lesion analysis

Improving the quality of the information extracted from MRI exams about what is actually going on in the brain, both in health and disease, has been an ongoing research effort since the 1980's, when MRI started to be used for medical diagnosis.

Now, an international team led by scientists from the Preclinical MRI lab, have taken a fundamental novel step in this direction and, in so doing, may also have found the most precise way yet to characterise stroke lesions, with the potential of radically improving the outcome for stroke patients.

Henriques, Magnetic Resonance in Medicine. 2021.

Scientists decipher how neuro-immune interactions burn deep fat

Obesity has been linked to cancer as well as to cardiovascular disease, which remain leading causes of death worldwide. The most harmful type of obesity is caused by the excessive accumulation of so-called "deep" fat, which envelops vital organs inside our abdominal cavity.

In a pioneering mouse study, the Immunophysiology lab presented the first known neuro-immune process by which brain signals instruct immune function in visceral fat stores. This discovery offers several novel therapeutic approaches for fighting obesity and obesity-related illness.

Cardoso et al., Nature. 2021.

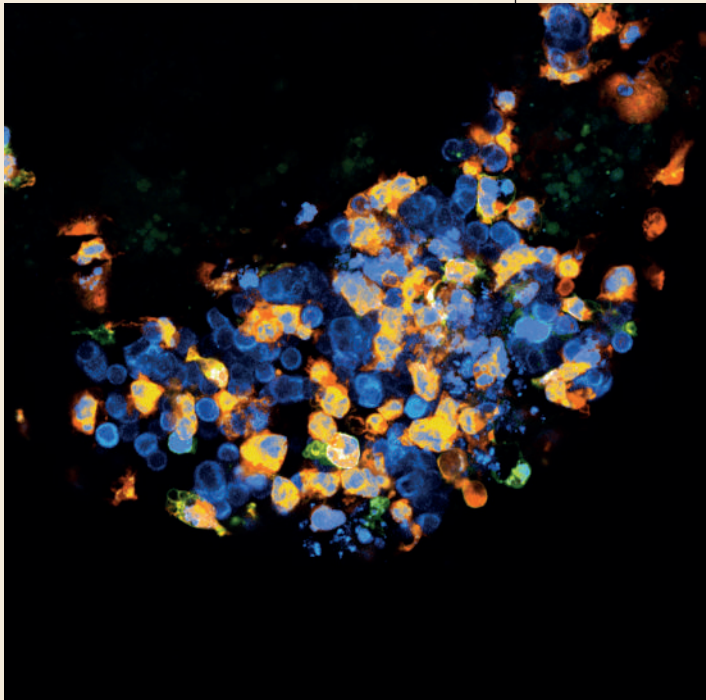


Good cop, bad cop

One of the functions of the immune system is to eliminate tumours. However, cancer cells have mechanisms to evade and even corrupt the immune cells so that they support tumour growth.

In this study, the Cancer Development & Innate Immune Evasion lab used zebrafish to shed light onto how cancer-immune crosstalk can either promote or suppress tumour growth. Ultimately, this study's results may help develop novel cancer therapies as well as an assay to select patients for immunotherapy treatment.

Póvoa et al., Nature Communications. 2021.



Imaging of a living brain can help clearly differentiate between two types of dementia

Dementia with Lewy bodies (DLB) is a neurodegenerative brain disease with symptoms common to Alzheimer's Disease and Parkinson's Disease. But unlike the latter two conditions, DLB also entails prominent mood and cognitive swings, sleep disorders, and vivid, sometimes terrifying, visual hallucinations.

Scientists from the Radiopharmacology Team confirmed that an imaging technique that traces neuronal dopaminergic deficiency in the brain can differentiate, *in vivo*, Alzheimer's Disease from the lesser-known DLB. This finding could have important implications for the specific management and treatment of these conditions.

Oliveira et al., Journal of Neurology, Neurosurgery & Psychiatry. 2021.

Taking the pulse of flies

We are so accustomed to the way our hearts seem to continuously mirror how we feel that we can easily imagine different hearts racing, aching or skipping a beat. But do the hearts of other animals actually follow the same rules when in danger?

Scientists of the Behavioural Neuroscience lab, discovered that the hearts of fruit flies respond to danger in very much the same way human hearts do. This result caught the researchers by surprise: In vertebrates (such as humans), these cardiac alterations are controlled by the autonomic nervous system, which fruit flies lack.

Barrios et al., Current Biology. 2021.



27M€ European Commission

11.5M€ Others

10.6M€ Fundação para a Ciência e a Tecnologia

3.2M€ "la Caixa"

1.3M€ Simons Foundation

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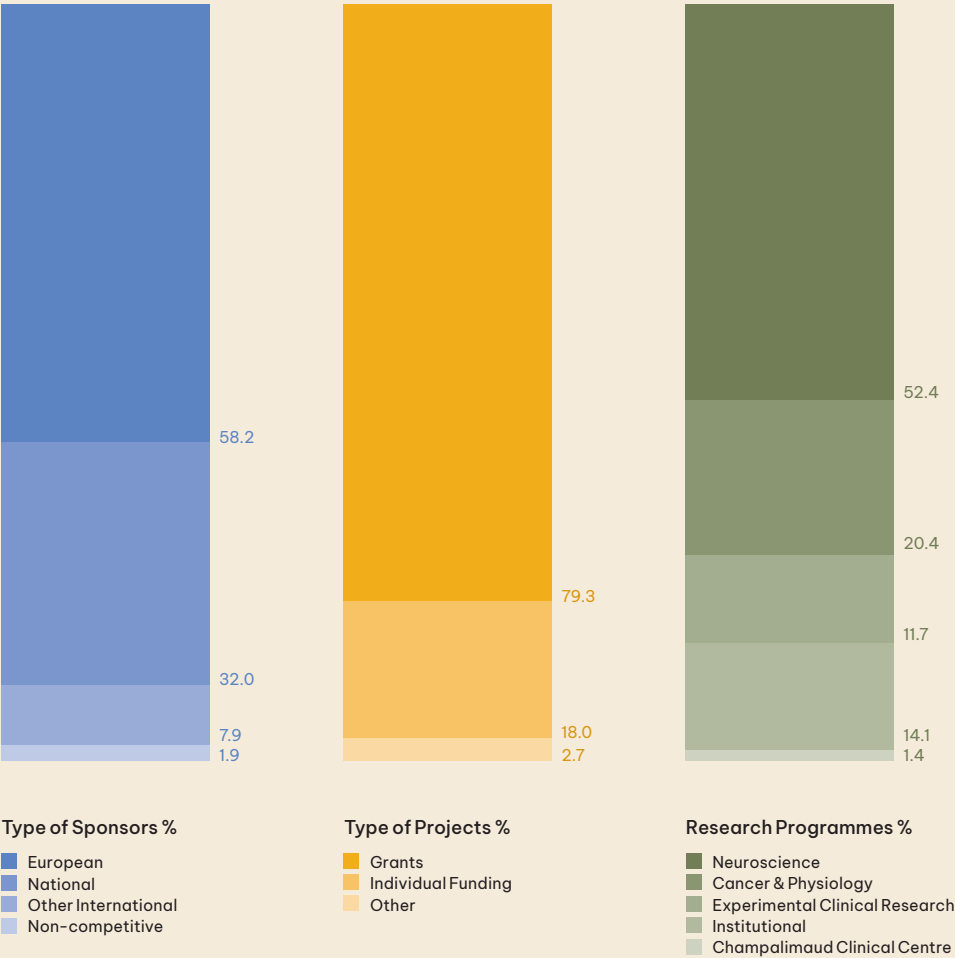
53.6M€ Total Competitive External Fund active during 2021



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 **53.6M€** was active at CR during 2021. These funds were awarded by a diverse group of national and international organisations. Among these, the major contributors were the European Commission and the National Portuguese Science Foundation (FCT).

Awarded Sponsored Research Funds 2017-2021



Funding Highlights

Santa Casa da Misericórdia de Lisboa Mantero Belard Prize

Since 2013, the charitable organisation Santa Casa da Misericórdia de Lisboa annually selects three research projects, led by scientists in Portugal. This year, the project of Noam Shemesh, was selected for one of the awards, called the Mantero Belard Prize.

The selected project focuses on Parkinson’s Disease. In particular, it aims to elucidate the relation between the molecular changes the disease induces in the brain and the symptoms patients suffer from. Shemesh’s research group will pursue this project using front of the line Imaging technology called ultrahigh field MRI.

CR Scientists Awarded 20 FCT Grants

In 2021, the Portuguese public agency for science, technology and innovation (Fundação para a Ciência e a Tecnologia) granted CR scientists 20 research projects through two separate calls.

FCT-funded research projects exemplify the wide scope of the three Champalimaud Research Programmes, with each receiving a similar number of grants. Research topics include, among others, cancer therapy response, neuro-immune interactions, collective behaviour and the neural circuits involved in reproduction and food choice.

- List of Awardees**
 Adriana Sánchez-Danés; Alfonso Renart; Ana Fernandes; Carlos Ribeiro; Catarina Brás; Cristina Godinho-Silva; Cristina João; Daniela Pereira; David Brea; Gonzalo de Polavieja; Henrique Veiga-Fernandes; Joana Maia; João Marques; Joaquim Alves da Silva; Leopoldo Petreanu; Maria Luísa Vasconcelos; Maria Martínez Lopez; Rita Fior (two grants); Roksana Pirzgalska.

CR Postdoctoral Researchers Awarded Competitive Fellowships

Four postdoctoral researchers received an EU-sponsored Marie Skłodowska-Curie fellowships, and one was awarded a fellowship from the Spanish Foundation “la Caixa”. The funding will support ambitious research projects in diverse topics in neuroscience.

Marie Skłodowska-Curie Actions Fellows

- Alexandre Leitão (Moita lab):
 The impact of genetic background during manipulation of neuronal activity;
- Gili Ezra (Ribeiro lab):
 How does a need turn to a want: using Drosophila melanogaster to identify how the gut-brain axis mediates protein appetite;
- Jonathan Cook (Lima lab):
 Neural mechanism underlying the central regulation of male sexual arousal and ejaculation;
- Joana Carvalho (Shemesh lab):
 Multi-dimensional mapping of the interplay between stability and plasticity in the adult visual pathway.

“la Caixa” Fellow

- João Marques (Mainen lab):
 Understanding how the brain produces types of movements.



74 PhD Students

39 Female

34 Male

1 Non-Binary

42 Portuguese

32 International*

* Austrian, Brazilian, Chilean, French, German, Hungarian, Indian, Italian, Jamaican, Dutch, Polish, Portuguese, Bielorussian, South-African, Spanish, Swiss, Turkish, British, American, Vietnamese.

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, two main endeavours are the International Neuroscience & Cancer Doctoral Programme and the CAJAL Advanced Training Courses.

The International Neuroscience & Cancer Doctoral Programme (INCDP)

Director: Joe Paton

CR Education Committee: Adriana Sánchez-Danés, Christa Rhiner, Susana Lima, Alfonso Renart

Graduate Studies Coordinator: Miguel Seabra, Thiago Carvalho (until April 2021)

Graduate Studies Office: Maria Teresa Dias, Jorge Henriques (Until April 2021), Ana Rita Vozzone (from November 2021)

Scientific Advisory Board: Alessandro Treves, *International School for Advanced Studies, Italy*; Gilles Laurent, *Max Planck Institute for Brain Research, Germany*; Darcy Kelley, *Columbia University, USA*; Maria Leptin, *EMBO, Germany*

The INCDP aims to provide students with a broad and integrative education in neuroscience and physiology, with a focus on the neuronal and circuit basis of behaviour, and on organismal biology.

A main goal of the programme is to foster and encourage active participation, independence, and critical thinking amongst the students, as they forge their path towards becoming innovative scientists and researchers. INCDP students come from all over the world and from a range of backgrounds, including the life sciences, physics, psychology, mathematics, and computational sciences.

During the first year of the programme, students attend courses that cover basic topics in contemporary biology and neuroscience. The courses have a strong practical component, as well as focus on quantitative skills. In addition, students also perform laboratory rotations, which allow them to familiarise themselves with the research done across different labs and select the lab where they will conduct their doctoral research.

Throughout their formation, Students are supported by a thesis committee that monitors their progress and provides input. The programme is accredited and degrees are granted by one of our two academic partners, ITQB NOVA – Instituto de Tecnologia Química e Biológica António Xavier, Universidade Nova de Lisboa, and ISPA – Instituto Universitário de Ciências Psicológicas, Sociais e da Vida.

PhD students at the Champalimaud Foundation enjoy a vibrant academic environment, with a weekly schedule of both internal and guest research and clinical seminars, as well as access to a wide range of meetings and workshops. INCDP students also have the opportunity and funding to organise their own advanced courses, as well as an annual retreat.

2021 INCDP Students

Thomas Soares Mullen UK

Ana Beatriz Rasteiro PT

Adrianna Bielowska PL

Sara Ferreira PT

Nicolas Junge-Huelsing DE

Rita Alves PT

Pedro Silva PT

Charlotte Rosher UK

Abel Sagodi HU

Saheli Roy IN

Inês Laranjeira PT

CAJAL Advanced Neuroscience Training Programme

The CAJAL Advanced Neuroscience Training Programme consists of six yearly courses, two held at the Champalimaud Centre for the Unknown in Lisbon and four in Bordeaux Neurocampus. These two institutes were chosen to be the first centres in Europe that will host recurring neuroscience training courses, following a model that has been successfully running in the USA for decades.



Students attending a seminar at the CCU Classroom.

Education Highlights

Three INCDP students receive top scores in the 2021 FCT PhD fellowship call

Naz Belkaya (Circuit Dynamics & Computation lab), Rory Beresford (Behaviour & Metabolism lab), and Ana Sofia Marques (Cancer & Stem Cell Biology lab), of the INCDP class of 2020, were the top 10 candidates of the 2021 FCT PhD Fellowship Call in the areas of Biomedicine and Experimental Biology & Biochemistry.

The Buddy Programme kicks off

As part of the onboarding experience, the student community at CR has developed the Buddy Programme, a useful and creative tool to welcome and support newcomers, providing a fantastic opportunity for students to meet their peers, exchange ideas, tips and advice.

Training initiatives led by the Student Scientific Committee

Student Scientific Committee: Diogo Duarte, Ana Gonçalves, Mafalda Valente, Anh Nguyen, Sofia Freitas

Scientific Illustration Course

September 2021

A two half-day hybrid workshop on Scientific Illustration, involving local SciComm office members, as well as invited designers.

Course design: Diogo Matias (CEO Team), Gil Costa & Erin Lenczycki

Number of participants: 55 (33 onsite, 22 online)

Arduino Course

October 2021

A five half-day Arduino workshop, gathering the talented in-house hardware platform staff and experienced PhD Student community.

Course design: Bruno Cruz (Learning lab), Artur Silva & Dário Bento (Hardware Platform)

Teaching Assistants: Ana Gonçalves, Diogo Duarte & Hugo Marques (Neural Circuits & Behaviour lab), Filipe Rodrigues & Sofia Freitas (Learning lab), João Frazão (Hardware Platform).

6 Theses Defences

2 Conferences

54 Seminars

35 Champalimaud
Internal Seminars

8 Workshops & Courses

Scientific Events

With the gradual lifting and easing of COVID-19 safety measures, the return of in-person events brought with it new challenges and opportunities. Whenever possible, CR has embraced the hybrid format, which uses state-of-the-art platforms and virtual tools as well as more sophisticated means to produce onsite events. This new approach has improved the way we work and how we communicate the science we produce, making it more accessible to everyone.

Champalimaud Research Symposium: Dialogues on Neural and Machine Intelligence

October 13-15, 2021

The first fully-hybrid edition of the Champalimaud Research Symposium took place in October last year, with speakers and attendees participating both onsite and online.

This year, the symposium focused on the interface of neuroscience, artificial intelligence and machine learning with the main goal of starting an interdisciplinary conversation about the deep conceptual problems that emerge when trying to understand how intelligent behaviour is produced in animals and machines. The topic was highlighted from different angles to promote a worthwhile cross-talk between experimental and computational researchers.

The event ran as a single-track scientific meeting with 23 invited speakers, talks selected from abstracts and two poster sessions in a hybrid edition, giving delegates the option to attend and present their work either in-person or online.



List of Invited Speakers

Keynote Speakers:

Manuela Veloso J.P. Morgan, USA
James DiCarlo Massachusetts Institute of Technology, USA
Ana Paiva Instituto Superior Técnico & The University of Lisbon, Portugal
Andreas Tolias Baylor College of Medicine, USA
Anna Kreshuk European Molecular Biology Laboratory Heidelberg, Germany
Anthony Zador Cold Spring Harbor Laboratory, USA
Blake Richards McGill University & Mila – Quebec Artificial Intelligence Institute, Canada
David Sussillo Google Brain Group, USA
Demba Ba Harvard's School of Engineering and Applied Sciences, USA
Eero Simoncelli New York University, USA
Gonzalo de Polavieja Champalimaud Foundation, Portugal
Ida Momennejad Microsoft Corporation, USA
Jakob Macke University of Tübingen & Max Planck Institute for Intelligent Systems, Germany
Jane Wang DeepMind, UK
Kimberly Stachenfeld DeepMind, UK
Konrad Kording University of Pennsylvania, USA
Matthias Bethge University of Tübingen, Germany
Odelia Schwartz University of Miami, USA
Peter Dayan Max Planck Institute for Biological Cybernetics, University of Tübingen, Germany
Terry Sejnowski The Salk Institute for Biological Studies & The University of California, USA
Valerio Mante University of Zurich, Switzerland
Walter Senn University of Bern, Switzerland
Yulia Sandamirskaya Intel Labs, Germany

The 2021 CR Symposium in Numbers

Oral Presentations

23 Invited Speakers:
12 onsite, 11 remote

11 Selected Speakers:
8 onsite, 3 remote

Poster Presentations

94 posters:
72 onsite, 22 virtual

Attendance
227 in-person, 70 online

Participants' Countries:

Portugal, Netherlands, Switzerland, Germany, France, UK, Brazil, Canada, USA, India, Turkey, Spain, Poland, South Korea, Vietnam, Italy, Israel, Norway, Argentina, Austria, Taiwan.

The Champalimaud Internal Seminar Series

The weekly Champalimaud Internal Seminar Series (CISS) has started with the establishment of CR, and while previously it was held at the CCU's Seminar Room, in 2021 it has become a fully virtual event. These seminars normally feature two 25-minute presentations by CR investigators that present their work to the community and receive feedback in a quick 5-minute Q&A session. The CISS helps create a community where everyone is familiar with each other's work, and cooperation and collaboration are facilitated.

The Brain-Body Interactions Seminar Series

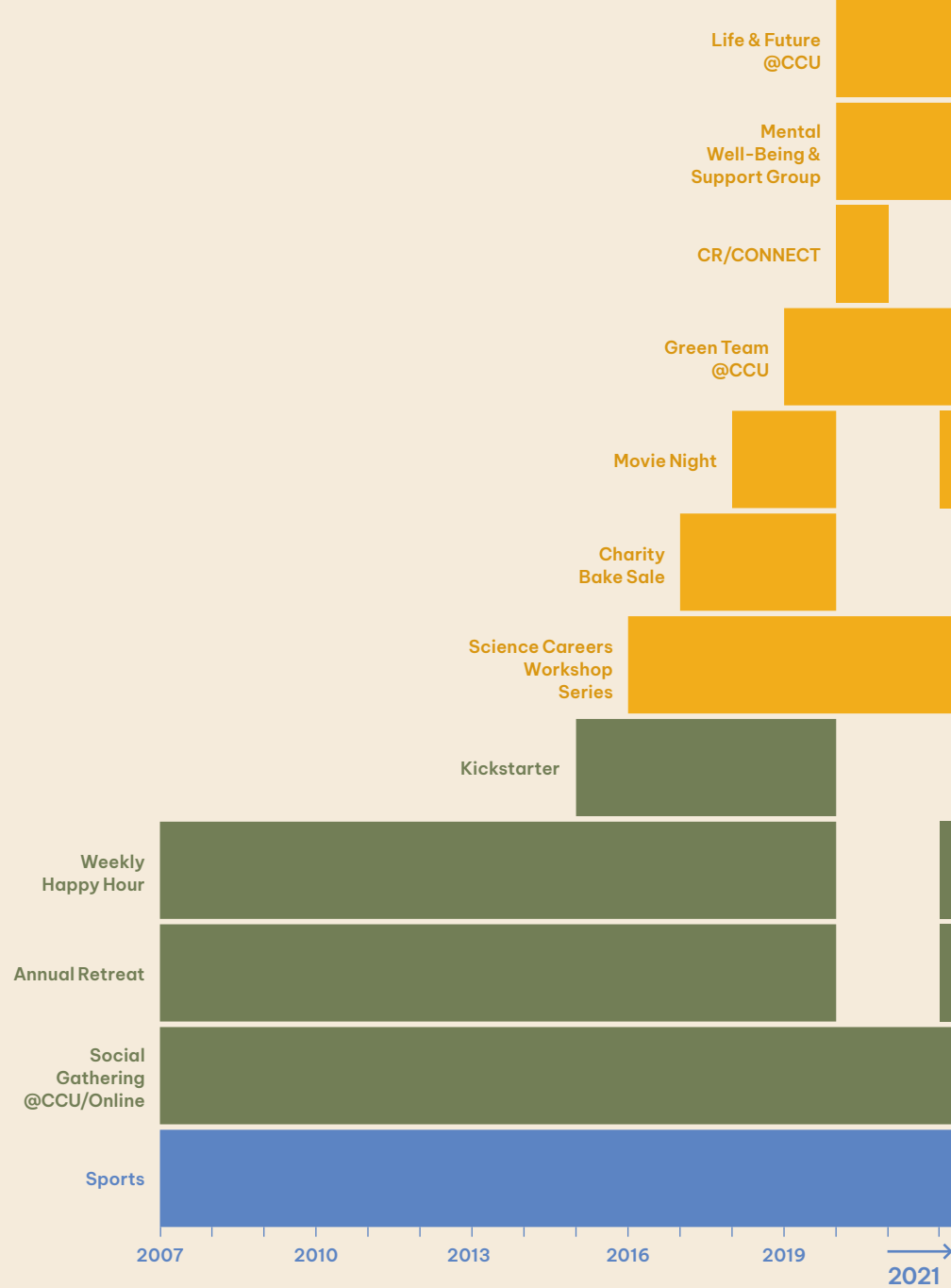
Since its establishment in 2020, the Brain-Body Interactions Virtual Seminar Series has brought together a global audience from the Americas, Africa, Asia, Europe, and Oceania, often with hundreds of attendants, who discuss a diverse spectrum of work ranging from interoception to neuroimmunology.

The series has emerged from the great momentum research integrating neuroscience with other biological fields has been gaining. Created by Carlos Ribeiro (Behaviour & Metabolism lab) and Asya Rolls (Technion, Israel), the series has quickly established itself as the main platform where top scientists in the field present their work and discuss it with an engaged audience. While curated and coordinated by Ribeiro and Rolls, the series is run and moderated by a worldwide network of students and postdocs working in the US (Harvard), Portugal (Champalimaud Foundation), and Israel (Technion).

The Brain-Body Interactions Virtual Seminar Series hosted 31 events in 2021.



Symposium participants enjoying a coffee break at the terrace of Darwin's Café between talks.



Culture

As the CR community grows, its culture evolves with it. Mainly driven by volunteers and supported by administrative staff, new initiatives emerge, accompanying others that have been running for years. Through it all, regular social gatherings promote a positive atmosphere and a sense of community.



CR members tidying up the lab as part of the Green Team's CLEAN UP & GREEN UP campaign.

Green Team @CCU

The Green Team @CCU is a grassroots movement of the CCU staff inspired to reduce waste production, as well as energy and water consumption, to achieve improved environmental performance. The team's mission is to help transform the CCU into a positive example of environmental sustainability in research, medicine and workplace practices.

In 2021, the Green Team, together with the Operations Unit, organised the first annual CLEAN UP & GREEN UP week at the CCU. With the motto "Be a (Green) Goat, Not a Sheep!" The initiative was divided into four phases:

1. Clean-Up work spaces (Sep 20-24);
2. Coastal Clean-Up to celebrate the International Coastal Clean-Up Day (Sep 25);
3. Flea Market where the unused items from the Clean-Up found new owners (Sep 27-30);
4. Upcycled Art Project where broken items from the Flea Market were used by in-house artists to shape their creativity into a sculpture featured during the CR Symposium 2021.

greenteam.fchampalimaud.org

Life and Future @CCU

This group brings together volunteer researchers and support staff to discuss and design solutions for a healthy and constructive workplace, responding to the community's needs. The group's initial focus was on drafting a Code of Conduct and they aim to help to design guidelines to prevent and address difficult situations that can arise in any organisation. Throughout 2021, this group continued to research and build a Code of Conduct tailored to CR, reaching a robust final draft ready for analysis by the administration.

Science Careers Workshop Series

The Science Careers Workshop Series was established with the goal of raising awareness amongst PhD students and postdoctoral researchers to the breadth of possible science careers, both in and outside of academia, and help them develop skills required for these career paths. The series is organised in collaboration between CR investigators, the Communication, Events & Outreach Team, and the QuantOCancer programme.

Mental Well-being & Support Group

Following the increased emotional stress caused by the pandemic, and to complement mental health support services offered at CR, a group of volunteers has formed the Mental Health Group. The guiding goals of this initiative are to identify and address common struggles affecting the CR community's mental wellbeing; promote an open dialogue on mental health topics; facilitate the access to services, tools and resources designed to nurture and monitor mental wellbeing and provide support; and create a stronger social and work support network within CR.

Social Gatherings

Social events are a constant feature of life at CR. And though they continued to happen virtually during the COVID-19 pandemic, nothing quite compares to in-person encounters, especially when they happen over drinks on a crisp November afternoon.

After almost two years of social distancing, the CF community came together to celebrate Magusto – a popular autumn tradition in Portugal and Spain, which gathers people around a bonfire to eat roasted chestnuts and drink a glass of Jeropiga. While we didn't have a real bonfire, we did have traditional beverages and a lot of chestnuts.



The CR Community celebrates Magusto at the amphitheatre.



Science Communication

One of CR's goals is to share knowledge not only within the clinical and scientific communities, but also with the public at large. Many CF members, at all career stages, adopt this vision by organising and participating in various outreach activities, both at and outside of the CCU. CR's science communication and outreach efforts are facilitated by the Communication, Events & Outreach Team. Below are a few selected science communication and outreach highlights of 2021.



Neuronautas' "Quack Experiment" team ventured into the wild of the Gulbenkian Garden in Lisbon to perform three different experiments on ducks. The image above presents a snapshot from their study on colour preference.

Science Education Programmes

Ciência di Noz Manera/ Science our Way

In Portugal, only 33% of high school graduates have access to higher education and when race and socioeconomic context are taken into consideration, this number often drops dramatically. To inspire students to pursue a higher education, a group of CF volunteers, with support from the QuantOCancer project, have been participating in the "Science Our Way" programme. This initiative organises large group meetings as well as workshops and mentoring designed for 8th and 9th graders (13-15 year olds). The first edition has been running at the Escola Pedro D'Orey da Cunha in the Lisbon suburbs.

LaMAA vai à Escola

In 2021, the educational project "LaMAA" worked with 7th graders from Escola Básica Damião de Góis, located in an underprivileged socio-economical area of Lisbon. In this special edition, 68 students were taught Mathematics, Natural Sciences and Physical-Chemistry in an innovative way, which included a game made of interactive quizzes that the LaMAA team had developed. This initiative gave the students access to content and know-how that they usually have difficulty obtaining, especially during the years of the pandemic.

*"LaMAA vai à Escola" is funded by the Lisbon City Council through the BIP/ZIP programme.

Neuronautas

Neuronautas is an educational programme belonging to the Academias Gulbenkian do Conhecimento. It was launched in 2019 as a hands-on science camp at the CCU for 10th-grade students. Unfortunately, due to the COVID-19 pandemic, the next edition couldn't happen on-site as planned. But the Neuronautas team wouldn't give up and in a monumental effort, the teaching staff created not just one, but two independent Neuronautas journeys – the Neurocadetes' Long Flight Course spanning four weeks, and the Chimeras' Short flight two-week adventure, which took place online over the months of June and July.

CR & the Media

In 2021, the Communication, Events & Outreach Team produced 21 Press Releases and assisted with 10 requests, resulting in over 500 mentions in the media. Press releases are written in an accessible manner that transforms complex scientific results into clear and engaging news stories.



Science on the Walls at the Junta de Freguesia das Águas Livres, in Cova da Moura – Amadora during the 2021 Science & Technology Week.

Outreach Initiatives

Science on the Walls

The “Science on the Walls” initiative taps into the power of urban art to bring together scientists and children living in underprivileged neighbourhoods in Lisbon. By sparking informal discussions and developing hands-on activities involving scientists, street artists and children, this project aims to make science more accessible and relevant for everyone and, ultimately, to contribute to a more inclusive and diverse environment in science and education. The initiative currently focuses on children living in a Lisbon suburb called Cova da Moura. During the 2021, several events took place in the neighbourhood, including an open art-science workshop on Science and Technology Week.

Conversations with Scientists – Decades of Science for Vaccine Days

This joint initiative coordinated by a group from Champalimaud Foundation, together with the COLife portaners, and in collaboration with Ciência Viva, promoted conversations between scientists and the general public on how the vaccines against COVID-19 were developed in record time, with effectiveness and safety guarantees. Between the 20th and the 30th of April, around 400 conversations took place, bringing 120 scientists to an audience of about 12,000 individuals, belonging to different audiences including schools, companies, associations and the media.

Tripping Into the (un)Known & Unpacking Bias with Ar Events

Celebrating its 10th anniversary, the volunteer-based outreach initiative Ar mounted two live virtual events in 2021: *Tripping into the (un)known: treating the mind with psychedelics* and *Unpacking bias: perspectives from neuroscience and social psychology*. Together, the events had over a thousand online participants and have been viewed more than two thousand times on the Champalimaud Research YouTube channel.

Videos & Animations

360° VR Tours | An Inside Look into Champalimaud Research

CF has become an iconic Lisbon landmark, but most people only ever get to see it from the outside. In the first episode of CF's immersive 360° video series, the public is invited inside for a visual journey through CR. Visits to other parts of the Foundation will become available in 2022.

CF's Animated Science Collection Receives an Award

Acesso Cultura, an association based in Portugal that promotes physical, intellectual and social access to cultural participation, has selected a text from the Science Collection Inside the Unknown as a winner of the 2021 Acesso Cultura – Clear Language Award. The winning text, *Should I stay or should I go?*, tells the story of how scientists from CR's Behavioural Neuroscience lab discovered a safety social cue.

Zoom-In on Champalimaud Season 1

The Champalimaud Centre for the Unknown is only as inventive, vibrant and resourceful as the people inside. In the first season of the short-video series "Zoom-In on Champalimaud", each episode turned the spotlight on a different member from our community, giving a glimpse of who the people behind the masks are.



The first installment of CF's immersive 360° video series invites the public for a visual journey through CR.

Thank you all!

134 Volunteers

| | | | |
|------------------------|----------------------|--------------------------|--------------------------|
| Adriana Sánchez-Danés | Carolina Seybert | Inês Laranjeira | Marta Moita |
| Albino Oliveira-Maia | Catarina Pimentel | Inês Soeiro | Matheus Farias |
| Alexandra Belchior | Catarina Ramos | Iolanda Évora | Megan Carey |
| Alexandre Azinheira | Charlotte Rosher | Isabel Campos | Mireia Castillo-Martin |
| Ana Assis | Claire Rusch | Jaime Grácio | Mirjam Heinemans |
| Ana Casaca | Clara Ferreira | Joana Gonçalves de Sá | Nicolas Junge Huelsing |
| Ana Gerschfeld | Cristina João | João Cruz | Nuno Loureiro |
| Ana Gonçalves | Danbee Kim | João da Fonseca | Patrícia Borges |
| Ana Maia | Daniel Münch | João Frazão | Pedro Gouveia |
| Ana Mena | Daniel Nunes | João Marques | Pedro Marcelino |
| Ana Queirós | Daniela Pereira | João Rico | Raquel Lemos |
| Andrada Ianus | Denise Camacho | Joaquim Alves da Silva | Raquel Lopes |
| André Almeida | Diana Batalha | Joaquim Teixeira | Raquel Mendes |
| André Marques | Diana Calixto | Joe Paton | Ricardo Borges Rodrigues |
| André Mendonça | Diana Mendes Freire | John Lee | Ricardo Silva |
| André Valente | Diogo Capelo | José Teixeira | Rita Figueiredo |
| Andreia Maia | Diogo Matias | Jovin Jacobs | Rita Fior |
| Anh Nguyen | Edite Figueiras | Julia Queiroz | Rory Beresford |
| Anna Hobbies | Eliane Arez Carvalho | Laura Fernandez | Ruth Diez del Corral |
| Anna Pezzarossa | Eric de Sousa | Laura Ward | Sara Abalde |
| Antonia Groneberg | Eric DeWitt | Liad Hollender | Sofia Castro e Almeida |
| António Monteiro | Fátima Cardoso | Liliana Costa | Sofia Freitas |
| Beatriz Belbut | Francisco Romero | Liliana Ferreira | Susana Lima |
| Ben Zarov | Frederico Severo | Luis Graça | Tatiana Silva |
| Brígida Maio | Gil Costa | Márcia Fontes | Teresa Fernandes |
| Bruna Costa | Gonçalo Cotovio | Marco Fragata | Thiago Carvalho |
| Bruno Cruz | Gonçalo Guiomar | Margarida Brotas | Tiago Coelho |
| Carla Emilie Pereira | Gonçalo Lopes | Margarida Caio | Tiago Morgado |
| Carmo Silveira Botelho | Hedi Young | Margarida Santos Saraiva | Tiago Quendera |
| Carolina Duro | Helena Lagartinho | Maria João Amorim | Vera Menino |
| Carolina Gorgulho | Helena Soares | Mario Aguilar | Victória Brugada |
| Carolina Pádua | Hugo Marques | Marta Correia | Violetta la Franca |
| Carolina Pestana | Inês Domingues | Marta Estrada | VIRUS (Artist) |
| | | | Zachary Mainen |

51 Partners

Acesso Cultura, Agrupamento de Escolas D. Dinis e Junta de Freguesia de Marvila, Agrupamento de Escolas da Damaia, ALBA Network, ARS NORTE – Administração Regional de Saúde do Norte, Biocant Park, BIP/ZIP Bairros e Zonas de Intervenção Prioritária de Lisboa – Câmara Municipal de Lisboa, CEDOC NMS – Centro de Estudos de Doenças Crónicas da NOVA Medical School, Centre for Social Research and Intervention (CIS-IUL), CEsa/CSG, CHUC – Centro Hospitalar e Universitário de Coimbra, Ciência Viva, Ciência Viva – ESERO Portugal, CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, CNC – Centro de Neurociências e Biologia Celular, COLife, DIS – Study Abroad in Scandinavia, Escola Secundária da Sertã, European Commission – Joint Research Centre (JRC) at Ispra, Exogenus Therapeutics, FMUP – Faculdade de Medicina, Fundação Calouste Gulbenkian, i3S – Instituto de Investigação e Inovação em Saúde, iBB – Instituto de Bioengenharia e Biociência, iBET – Instituto de Biologia Experimental e Tecnológica, iBiMED,

IGC – Instituto Gulbenkian de Ciência, IMM – Instituto de Medicina Molecular João Lobo Antunes, Instituto Superior Técnico (IST-UL), Instituto Universitário de Lisboa (ISCTE-IUL), IPO – Instituto Português de Oncologia do Porto Francisco Gentil, ISEG, ITQB NOVA – Instituto de Tecnologia Química e Biológica António Xavier, Junta de Freguesia das Águas Santas, Laboratório Colaborativo – InnovPlantProtect, Laboratório Colaborativo – ProChildCoLAB, Laboratório de Instrumentação e Física Experimental de Partículas (LIP), NeuroGEARS, Patient Innovation, Plano Nacional de Leitura 2027, QuantOCancer, Rede Academias Gulbenkian do Conhecimento, Soapbox Science Lisbon, Spanish Embassy in Portugal, Task force do Plano de vacinação contra a COVID-19 em Portugal, TreeTree2, UCP – Univ Católica Portuguesa, ULIS, Universidade da Madeira, Universidade de Aveiro, Universidade de Coimbra, Universidade de Évora, Universidade de Lisboa, Universidade do Porto, Universidade NOVA de Lisboa, Universidade de Lisboa, Universidade do São Paulo – USP.



Scientific
& Technological
Platforms



CR Support Units

Research Support

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

Scientific & Technological Platforms

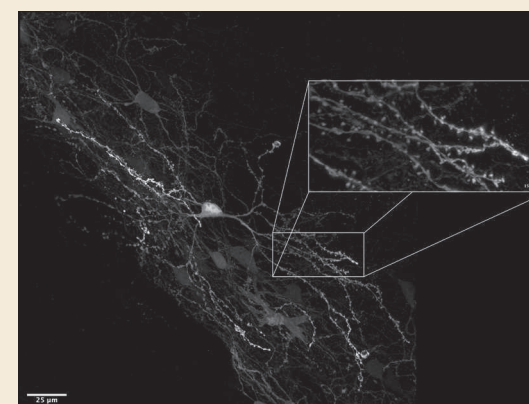
The Scientific and Technological Platforms count ten individual units that support the work of researchers and clinicians at the CCU. The Platforms operate in a wide range of areas, from the development of sophisticated technologies in animal models, imaging tools, hardware and software, to managing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

Advanced Biolmaging and BioOptics Experimental (ABBE) Platform

Coordinator: Davide Accardi
Microscopist & Imaging Specialist: Anna Pezzarossa
Research Technician: Leonor Morgado

The ABBE Platform provides the equipment and expertise to support CF researchers in the acquisition of high-quality microscopy data. The platform assists users throughout the complete imaging pipeline, including project discussions to identify the most appropriate imaging strategy, detailed technical training and support in image processing, analysis and visualisation. The ABBE Platform is managed by an international team with multidisciplinary background, and is therefore able to offer multi-scale capacity, imaging protein interactions to whole organisms. The team also represents CF on an international level through conferences and committees, and serves as a bridge between CF and microscopy companies, not only regarding technical issues, but also in order to envision, negotiate, establish and keep long-term partnerships.

As a result of the Evergreen Programme – a long term partnership between ZEISS and CF signed in 2020 – three high-end brand-new systems were installed in 2021. In particular, the new systems include two confocal microscopes (one inverted and one upright), offering extremely high resolution, superior speed and sophisticated complementary equipment. The third system is an inverted wide-field microscope specifically thought for long term observation of living specimens, equipped with a fast LED for quick and gentle illumination, incubator, and high sensitivity camera.



The main image shows a neuron captured at high resolution. A zoomed-in view (white rectangle) reveals neural dendrites (fine neural branches) and spines (tiny synaptic structures measuring 100–300nm). (Scale-bar in the main image: 25 µm. Scale-bar in the zoomed-in image: 150nm.)

Image by Daniela Pereira and Davide Accardi.

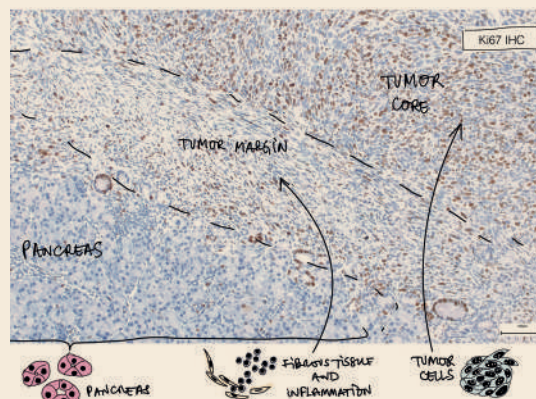
Histopathology Platform

Coordinator: Tânia Carvalho

Histotechnologists: Maria Inês Romano, Sérgio Casimiro, Susana Dias, Joana Carvalho

The Histopathology Platform provides high-quality services to the CF scientific community. The platform's services include, among others: selection of 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; and the preparation of written reports, supporting images and assistance in manuscript/grant preparation.

This year, the platform processed, cut, stained and analysed more than twice the number of samples compared with last year, and four times more than in 2019. There are about 22 research groups and more than 70 CF researchers who use the services of the histopathology platform, from the areas of cancer, neurosciences and clinical research. Until July 2021, the team continued to support the CF COVID-19 Lab, specifically Susana Dias, Sérgio Casimiro and Maria Inês Romano. The goal for 2022, is to automate and digitise the laboratory in order to maximise resources: reducing turnaround time and increasing the quality and amount of information extracted from each sample.



Histological sample acquired from a mouse model of pancreatic cancer.

Glass Wash and Media Preparation Platform (GWMPP)

Coordinator: Cátia Feliciano

Group Head: Maria José Vito

Technicians: Diogo Martins, Soraia Rodrigues, Madalena Martins

The GWMPP supports the investigators of the CCU by providing clean and sterilised lab-ware, as well as preparing materials required for research protocols, such as high quality tissue culture and bacteriological media. The platform's services also include cleaning and calibration of certain types of equipment and specific rooms. Finally, the GWMPP is also in charge of conducting good practises and biosafety training.

In 2021 the GWMPP provided daily services to users of 23 CR labs, seven platforms, and three Champalimaud Clinical Centre units, namely the Nuclear Medicine, Pharmacy and Radiotherapy Units. The GWMPP is also part of the COVID-19 Champalimaud Task Force, which requires a complex daily logistics operation in order to perform the screening tests. To ensure the success of this operation, the team follows meticulous procedures of storage and organised records.



Experimental workbench at one of CR's Open Lab areas.

Model Animals Platforms: Rodent, Fly & Fish

Rodent Platform

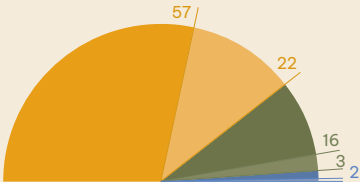
Coordinator: Isabel Campos
Veterinarian: Dolores Bonaparte
Service Manager: Ana Vaz
Operational Manager: Rita Torre (until June, 2021), João Pereira
Assisted Reproduction Technicians: Catarina Craveiro, Ana Pereira
Health & Welfare Monitors: Catarina Carvalho, Bruno Novais, Carlos Silva
Colony Managers: Erineo Silva, Leonor Gomes, Ricardo Silva, Laura Carvalho, Céline Freitas, Ana Costa, Sónia Gomes, Jhosaba Abreu
Technicians: Wilma Sobral, Wilcilaya Pontes, João Rodrigues, Cláudio Macedo, Rita Gonçalves, Rodrigo Santos

The Rodent Platform is primarily responsible for the maintenance and veterinary assistance of all CR rodent animal models, strictly following European Guidelines (Directive 2010/63/UE of September 22, 2010), National Laws (Decree Law 113/2013, of August 7) and Federation of European Laboratory Animal Science Associations (FELASA) guidelines and recommendations concerning laboratory animal welfare, scientific use and proper education/training of all personnel performing animal work. Apart from managing and maintaining all shared equipment and spaces in the facility, the platform staff also provides daily care and monitoring of animals and comprehensive colony management which complies with the best animal welfare practises, refinement and reduction policies. The Rodent Platform also runs a set of highly specialised and technically demanding services, including some performed in close collaboration with the MTT Platform.

Fly Platform

Coordinator: Isabel Campos
Manager: Liliana Costa
Technicians: Catarina Craveiro, Carina Portugal, Ana Reis, Sofia Silva (until May, 2021), Patrícia Valentim, Zichiena Zovo

The Fly Platform provides state-of-the-art conditions for breeding, maintenance and manipulation of *Drosophila* to all CR researchers. Apart from management and maintenance of all shared equipment and spaces, the platform provides technical services ranging from core activities such as medium production and stock maintenance, to more technically demanding procedures such as organ dissection, staining and embryo microinjection.



Revenue per institute %

- Fundação Champalimaud
- Instituto Gulbenkian de Ciência
- CEDOC
- Universidade do Algarve
- Instituto Tecnologia Química e Biologia António Xavier
- Instituto de Medicina Molecular

Fish Platform

Coordinator: Ana Catarina Certal
Platform Manager: Joana Monteiro
Animal Technicians: Seidy Semedo (until May, 2021), Esperança Ribeiro (since May, 2021)
Aquaculture Technician: Ricardo Pires, Maria João Pereira
Research Technicians: Inês Oliveira, Mariana Sampaio, Olivia Knight
MSc Student: Inês Almeida

The Fish Platform is responsible for state-of-the-art housing and husbandry of CR fish models under high health and welfare standards. The platform also provides an ambitious set of supporting research services, while maintaining a close and constant collaboration with CR researchers to best meet the community needs. The platform's commitment to scientific and technological development in the fields of fish husbandry, welfare and applied technologies, has been translated into independent and collaborative projects with both national and international institutions, resulting in several peer-reviewed publications and presentations at international meetings, which have granted the platform substantial international recognition. The Fish Platform is also part of CONGENTO, through which it offers fish services, training and consulting to the national and international community.

In 2021, two collaborative studies involving the CF Fish Platform were published, one in the journal *Zebrafish* (Langa et al.) and another in the journal *Chemosphere* (Rodrigues et al.). Also, Inês Almeida successfully completed her Master's thesis.

Flow Cytometry, Software & Hardware Platforms

Flow Cytometry Platform

Coordinator: Pedro Garcia da Silva
Group Head: Ana Vieira
Technicians: Carla Oliveira, Renato Colaço

The Flow Cytometry Platform is equipped with state of the art equipment to provide high quality service to the CF community and to external researchers who require this technology in their research projects. Flow cytometry staff provides training in flow cytometry concepts, experimental planning and controls, instrument operation as well as data analysis.

In 2021, the Hardware and Software teams consolidated their position regarding creation and development standards for scientific products, specifically referring to specialised experimental hardware and computing infrastructures. "Full stack" experimental hardware solutions were developed internally, with "end-to-end" support for scientists, including constructing custom-made hardware for experiments and expediting the analysis and storage of the data generated by this same hardware. This consolidation provided, in turn, time to initiate a new branch of development in health care. These include the creation of robotic mobility solutions, and a platform for the submission and evaluation of clinical projects, which is part of a larger project that recently won the AICIB award. Specifically, we have developed a new robotic chair to facilitate the mobility of patients at the Champalimaud Cancer Clinic, taking into account the reduced mobility of most post-surgical and advanced disease patients, to improve their quality of life. A prototype of an autonomous navigation chair was also created, which allows the patients to reach any point in the building independently.

Scientific Software Platform

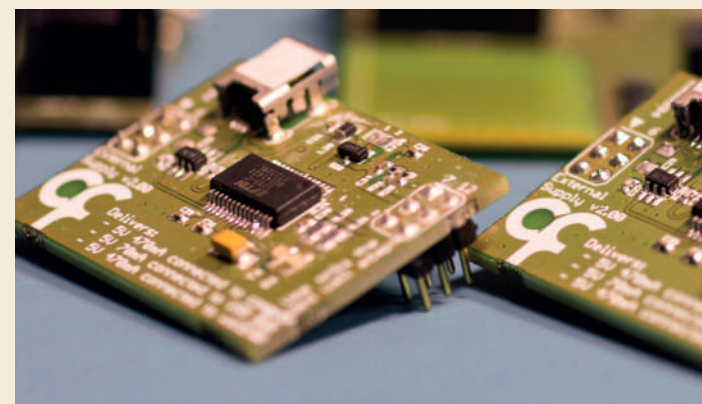
Coordinator: Pedro Garcia da Silva
Cloud Specialist: João Baúto
Data Manager: Hugo Cachitas
Software Developer: Luís Teixeira

The Scientific Software Platform aims to support high-level scientific research by providing high-quality software support and ensuring the performance of CR computational infrastructures. With educational backgrounds in Software, Electrical and Physics Engineering, the Platform's team members have a broad range of skills and knowledge in areas such as computer vision, image processing, machine learning, hardware control, graphics, web, data management and systems administration.

Scientific Hardware Platform

Coordinator: Pedro Garcia da Silva
Hardware Developer: Artur Silva
Hardware Technician: Dário Bento
Mechanical Developer: Paulo Carriço
Mechanical Technician: Filipe Mendes

The Hardware Platform aims to provide specialised support with the development of custom electronic hardware and custom fabrication. With many years of expertise in design, procurement and assembly of electronics and mechanical components, the Hardware Platform has a broad range of skills and knowledge, with applications ranging to both clinical and scientific applications.



Electronic device
manufactured by the
Scientific Hardware Platform.

Molecular and Transgenic Tools Platform (MTTP)

Coordinator: Ana Catarina Certal

Molecular Tools & COVID-19 Lab Manager: Ana Raquel Tomás

Senior Research Technician: Ana Cunha

Research Technicians: Mariana Velez, André Monteiro, Simão Margarido (since July, 2021)

Laboratory Technicians: Alexandra Teixeira, Joana Gomes (until November, 2021), Kateryna Kholod, Sara M. Ferreira (until August, 2021)

The MTTP performs complex cloning, gene editing and viral production projects. It assists users during all project stages, including conceptual design. The platform is now providing regular genotyping services for several animal models and acts as a hub of shared resources and expertise not only for the CR, but also for the national and international research communities, academic and industry, by providing services through the CONGENTO Research Infrastructure.

In 2021 the MTTP, in close collaboration with the Champalimaud Clinical Centre, maintained the coordination of the CF COVID-19 Test Lab providing molecular diagnosis for SARS-CoV-2 by RT-PCR and antigen tests as well as COVID-19 serological tests. The MTTP, together with the CRSU Operations Unit, has also coordinated the CR weekly antigen tests and the progress of the CR vaccination status, always acting as liaison with the CCU's Hospital Infection Control Committee. In 2021, the COVID-19 Test Lab performed more than 18,000 RT-PCR tests, 20,000 antigen tests and 800 serological tests. The Platform Head, Ana Catarina Certal, was also involved in a major serological post-vaccination study in nursing homes in collaboration with the Algarve Biomedical Centre. This study, involving more than 5,000 subjects, showed that the presence of circulating IgG antibodies for COVID-19 decreased drastically 6 months post-vaccination (2 dose-scheme) and after 70 years of age. Remarkably, antibody presence was maintained in all age groups over time (at least until 8 months post-vaccination) in cases where subjects had one vaccine dose + natural infection.



Members of the MTTP team meeting at the first-floor coffee lounge.

CR Support Units

The CR Support Units (CRSU) provide all administrative, financial and operational assistance to the CR community. Accompanying the evolution and growth of CR, the support provided to CR's scientists also continuously grows in organisation and capacities.

The CRSU team aims to provide all science administration, management and communication support to boost the work of scientists, maximising the focus on research.

CRSU Coordination

Director of Research Support: Ryan Herbert
Executive Assistant to the CR Direction Team: Inês Soeiro

The CRSU Coordination Team receives, delegates and implements direct instructions from the Research Direction Team and serves as a primary contact point for any problem-solving needs within CR, being able to advise on the resources available to the CR community.

2021 was a year of transition. As the pandemic and vaccination conditions evolved over the year we transitioned from remote support and collaboration, to more onsite presence when conditions improved, and back to remote when necessary. This included not only daily support and teamwork, but also larger scale in-person activities that we have traditionally looked forward to, such as faculty recruitments, guest speakers, symposia, and the external scientific evaluation panel. As part of this year of change, we also welcomed many new team members to the support units and said goodbye to many cherished others. We are thankful for the dedication of everyone and are looking forward to the viewpoints and contributions of our new team members.

CF Pre-Award

Coordinator: Joana Lamego
Pre-Award Grant Managers: Filipa Lourenço Cardoso,
Mariana Santa-Marta, Bruno Ceña, Andreia Tavares

2021 marks five years since the CF Pre-Award team was founded. In this period, the team has developed, together with the CF community, a unique framework, grounded in four pillars, for the provision of support to the securing of national and international research funds:

Tailor-made:

Each research group is supported by a pre-award element, ensuring constant engagement and efficient communication with the research community;

Coordinated:

each pre-award element is responsible for the coordination of the support provided per extramural sponsored call on a rotational basis, ensuring efficient communication between all team elements and a consistently high level of support provided by each element;

Monitored:

By applying the Rapid Cycle Improvement method to the support provided, ensuring a continuous feedback loop;

Supportive:

Alone we go faster, together we go further.

The hard work of the CF research ecosystem has been rewarded with over €53 M in sponsored research funds, two-thirds of which from international sponsors.

Focusing on 2021, the Pre-Award team has disseminated 293 funding opportunities, assisted the CF research community with the preparation and submission of 193 research project applications to more than 45 different funders, and supported the successful awarding of 30 projects.

Communication, Events & Outreach (CEO) Team

Coordinators: Catarina Ramos (Science Comm., Education & Outreach), Teresa Fernandes (Clinical and Institutional Comm. & Events)
Scientific Events: António Monteiro (Coordinator), Ana Casaca (Organiser)
Science Writer & Content Developer: Liad Hollender
Communication Consultant: John Lee (Part-Time)
Designers: Marta Correia (Senior), Diogo Matias, Carla Emilie Pereira (Maternity Cover)
Digital Content & Social Media Editor: Hedi Young
Multimedia & AV Support: Alexandre Azinheira (Senior), Tiago Coelho
Project Manager (LaMAA): André Mendonça

The CEO team was officially established in 2020, as a result of the integration of three groups – CR's Science Communication team, CR's Scientific Events team and CF's Brand, Communication and Image unit. Our mission is to involve the whole of society in health, research and innovation processes, while effectively and accurately communicating the activities carried out at the Champalimaud Foundation.

2021 was a year full of “firsts” for the CEO Team. For one, the team organised the first fully hybrid CR Symposium, a technically ambitious feat, which successfully gathered 350 scientists onsite and 161 online. Another virtual “first” was the production of a 360° VR Tour, that invited the public to a journey through CR (Virtual visits to other CF sites will follow in 2022!). It was also in 2021 that, for the first time, the CEO team coordinated an online science literacy campaign. The COVID-19 vaccines literacy campaign was done in a collaboration with COLife partners and Ciência Viva (the National Agency for Scientific and Technological Culture). With the participation of 120 scientists, the campaign reached approximately 12.000 students and teachers in Portugal and Portuguese speaking countries.

Illustration made for the Ar event Tripping into the (un)known: treating the mind with psychedelics.

By: Diogo Matias.



Graduate Programme Office

Coordinator: Miguel Seabra, Thiago Carvalho (until April, 2021)
Officers: Maria Teresa Dias, Jorge Henriques (until April, 2021),
Ana Rita Vozzone (since November, 2021)

The Office mainly runs through the Teaching Lab and Classroom, the hubs of our PhD programme and all courses delivered at the CCU. The team deals with the administrative and logistical aspects of the INCDP programme, the CAJAL courses, and other teaching events, in addition to supporting courses such as the Fundamentals of Medicine postgraduate programme (a partnership between CF and the University of Algarve). The team also manages the CR library, the Teaching Lab space, and the Classroom bookings. In addition, the Graduate Studies team assists with the students' social events, helps organise the INCDP PhD student admission process, and hosts the annual visits of the programme's scientific advisory board. Since 2020, the Graduate Programme Office has also been supporting students wishing to apply to fellowships including FCT, Boeringher and Fundação "la Caixa".

One of the year's highlights was the "Student Orientation Week (1st Edition)", organised by the Student Welcome Committee and the Graduate Studies Office. More than 70 CR members participated in the event, introducing students to the community's culture, mission, vision, and values through tours, talks, training activities, and social events, all aiming to welcome the students to our vibrant community and to the city of Lisbon.



Picnic at the Belém Tower Gardens for newly-arrived INDPD students and CRSU staff (organised as part of the students' orientation week).

HR & Fellows Support Office

Coordinator: Teresa Carona
Assistant: Pedro Alves

The Fellows Support office is one of the support units at CF that serves both the Research and Clinical research staff – around 400 people. The FSo provides assistance with personal affairs, from the opening call and recruiting stage to follow up after leaving CF. This unit works closely with HR representatives as well as the other support units and platforms, to ensure that all commitments with the researchers are met.

In 2021 the FSo processed ~80 onboarding, ~50 offboarding, ~15 visa and permits, ~30 Social Security requests, and issued over 110 statements.

While the pandemic was challenging, it was as well an eye opener from the improvements that could be done and an inspiration for new and fresh ideas to provide central support for HR policies, benefits, reporting and classification, training and recruitment. The team is, as ever before, focused and excited to promote the wellbeing of all researchers and co-workers not only with respect to work-related issues, but also with respect to various social issues. New partnerships, experts consultation and team members are thought to foster a respectful environment that inspires excellence and well being of all CF researchers.

Health & Science

Coordinator: Teresa Fernandes
Health & Science Writer: Ana Gerschenfeld

As CF's clinical research activities expand and diversify, the output from projects developed at the Champalimaud Clinical Centre, and in particular by the Research Groups of the Clinical and Experimental Research Programme, call for increasing communication efforts. This includes the production of content and events to bridge the gap between clinical research and the public at large.

Lab Administration

Coordinator: Raquel Gonçalves
Lab Administrators: António Raposo, Cecília Simas,
Telma Carrilho, Vesna Petojevic

The Laboratory Administration team provides support to the scientists working at CR so that they can focus on research. Every lab is assigned an administrator that works closely with the PIs and lab managers, assisting with ordering processes, budget management, travel arrangements, and other tasks. The Lab Administrators regularly collaborate with other CR support units and CF departments such as post-award, logistics, accounting, IT, and maintenance, as well as with external agents such as suppliers, service providers, shipping companies and brokers.

In 2021, the Lab Admin Team adapted responsively to the changing COVID-19 situation. It provided onsite and remote support and adapted its procedures in order to continue supporting CR scientists throughout the pandemic in a challenging and growing demand for all types of lab supplies.



The lab administrators are vital for transforming newly-made lab spaces into vibrant research environments.

Operations

Coordinator: Cátia Feliciano
Operations Technician: Rita Marques

The Operations Unit is responsible for the operational management of the CR laboratories, ensuring that the day-to-day activities run smoothly by providing assistance in a timely and effective manner to the community. The Operations Unit is the contact point for all the infrastructure, maintenance, equipment and space management of the CR laboratories while being responsible for the development and implementation of policies and procedures in coordination with the Direction Team. The Operations Unit is also responsible for setting up new labs, working with the principal investigators on planning and organising the resources needed, assisting with new equipment acquisition and installation, while providing general assistance and guidance.

In 2021, a Health and Safety Unit was created with the goal of improving the labs' Health and Safety work conditions. As part of this endeavour, a SafeLab website was launched, making various resources easily accessible, including a new chemical safety database and a repository containing all relevant safety information. Also, in May 2021, Rita Marques joined the Operations Unit as a technician, taking on various responsibilities such as helping with emergency issues and ensuring equipment maintenance contracts with in-house and external companies. Finally, Cátia Feliciano continued her role as COVID-19 Operations Manager in 2021, maintaining continuous collaboration with the CCU's Hospital Infection Control Committee.

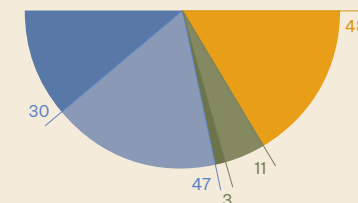
Office for Sponsored Programmes (OSP) – Post-Award

Coordinator: Joaquim Teixeira
Scientific Officer: Francisco Semedo
Project Officers: Carina Quintal, Helena Duarte, Henrique Moreira, Inês Bonifácio, Pedro Monteiro, Rizwana Mahomed, Sandra Jacinto, Sofia Venâncio, Vanda Vicente
Project Managers: Laura Ward (QuantOCancer), João Cruz (CONGENTO)

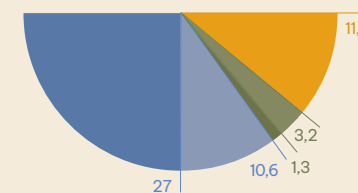
The OSP – Post-Award Team provides help and support in issues related with grant reporting (financial and scientific), grant administration, internal audit and compliance. The office also works as a facilitator, creating bridges between the CR Scientific Community and each funding agency, helping to navigate the more bureaucratic aspects of grant management. The project managers are responsible for the day-to-day implementation of large-scale institutional and consortia projects. They play a pivotal liaison role, acting as the centre of communication for all internal and external stakeholders, monitoring project progress, identifying risks, coordinating technical reporting and ensuring effective dissemination.

In 2021, the OSP – Post-Award office helped to manage 53.6M€ distributed over 139 different projects. A total of 158 financial reports and 70 scientific reports were submitted to a multitude of funding agencies, on behalf of the Research Community.

Number of Active Grants in 2021



Total Funding Amount (M€)



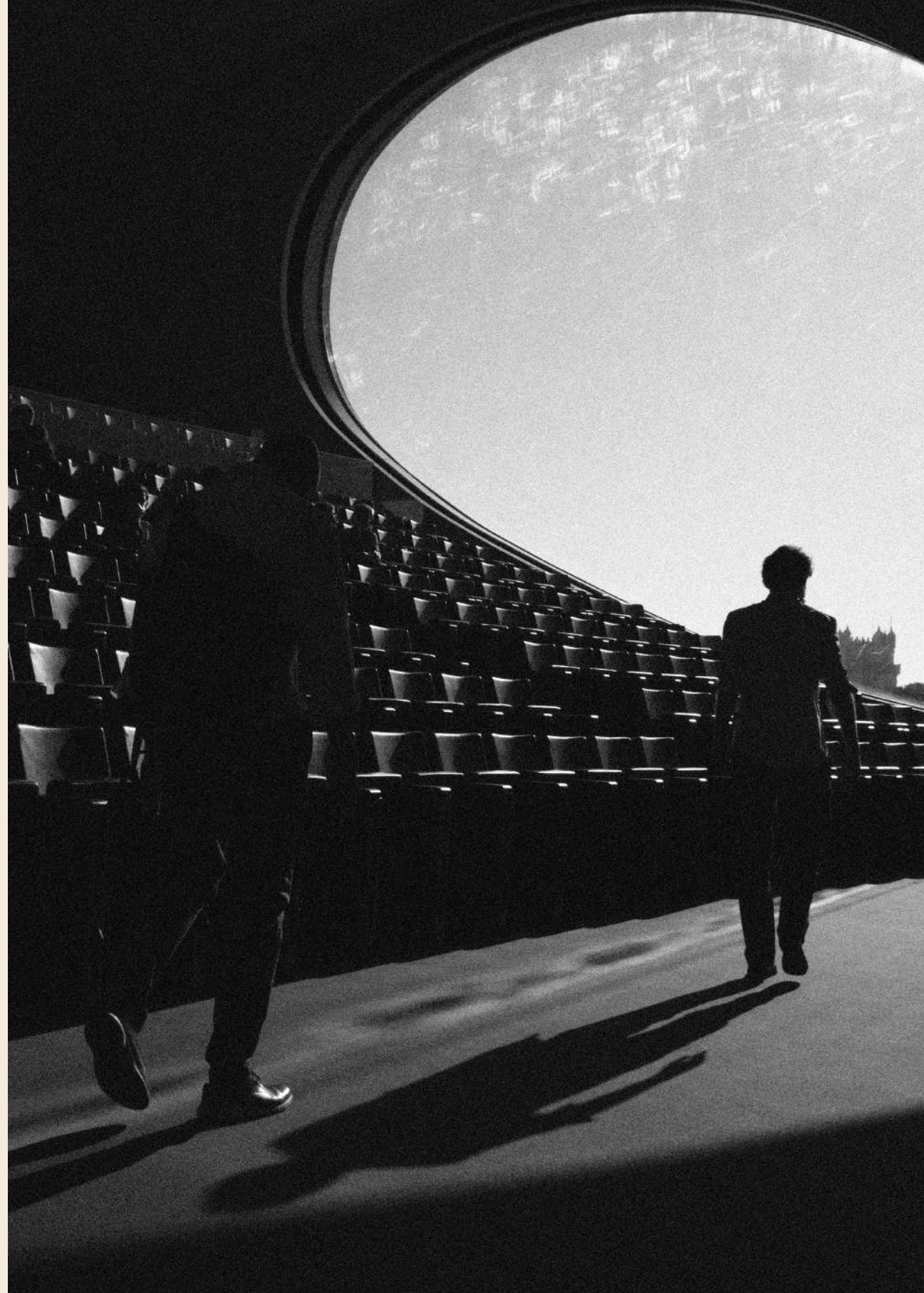
European Commission
Fundação para a Ciência e a Tecnologia
Simons Foundation
"la Caixa"
Others

The QuantOCancer Project

ERA Chair: Adriana Sánchez-Danés
Project Coordinator: Celso Matos
Project Manager: Laura Ward

QuantOCancer is an EU-funded ERA Chair project aiming to increase research capacity and collaborations within and beyond CR. QuantOCancer provides formal and informal training opportunities for researchers, clinicians, and support staff, engages a Responsible Research and Innovation culture and develops institutional strategies towards an equitable working environment. Adriana Sánchez-Danés (Physiology and Cancer Programme) holds the position of ERA Chair and establishes the Cancer and Stem Cell Biology research line. See Sánchez-Danés research summary for more details.

In 2021, QuantOCancer continued to run a strong programme of initiatives around the themes of open access, gender, ethics and science education. In particular, we highlight the workshop "Justifying your Research Design: Sex and Gender Dimensions" facilitated by Gendered Innovations expert Sabine Ortelt-Prigione and showcasing our own internal expertise, and the science education initiative "Ciência di Noz Manera" ("Science Our Way") bringing researchers closer to underserved high school students in Lisbon.





The Nitty Gritty

For those who want to know about what we've done in more detail.

Publications

Research Articles

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External Funding

The list below includes external competitive funds that were awarded during 2021, as well as external competitive funds that were awarded previously and were actively running at the CCU during 2021.

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: 01/10/18-30/09/23

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

Fundação para a Ciência e a Tecnologia

Champalimaud Research Programme
Call/Programme: 2017/2018 R&D Unit evaluation
Active period: 01/01/20-31/12/23

Portugal 2020 (PT2020)

PT2020 – BIOIMAGING–INFRAESTRUTURAS / PPBI – Portuguese
Coordination: i3S Platform of BiImaging
Call/Programme: 01/AICT/2016
Active period: 01/06/17-30/09/21

Biodata.pt Portuguese Biological Data Network
Coordination: Instituto Gulbenkian de Ciência
Call/Programme: 01/AICT/2016
Active period: 19/06/17-17/06/21

FCImuno – Centro de Valorização e Transferência de Tecnologia em Imunoterapia da Fundação D. Anna de Sommer Champalimaud e Dr. Carlos Montez Champalimaud
Call/Programme: LISBOA-46-2018-22
Active period: 01/01/19-31/12/22

Research Projects/ Grants

American Portuguese Biomedical Research Fund

Rita Fior
Erythrocyte Surveillance – the immune system looking within?
Call/Programme: APBRF
Active period: 21/08/18-31/12/21

Beug Foundation

Ana Luísa Correia
Harnessing neuron-NK cell interactions to prevent metastasis
Call/Programme: Metastasis Prize
Active period: 2021-2022

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

Gautam Agarwal (Mainen lab)
Dissecting dynamical components of complex decision-making using a computer game-based task
Call/Programme: Funding for Scientific Research 2018/2019
Active period: 02/01/19-31/12/21

Brain and Behavior Research Foundation

José Oliveira (Oliveira-Maia lab)
Influence of markers of immune dysfunction on orbitofrontal cortex recruitment during a decision making task in obsessive-compulsive disorder
Call/Programme: NARSAD Young Investigator
Active period: 15/07/19-14/07/22

Breast Cancer Now

Bruno Costa-Silva
Bosutinib effects in pre-metastatic niche formation and lung metastasis in breast cancer
Call/Programme: Catalyst Programme
Active period: 04/06/18-31/12/21

Buck Institute for Research on Aging

Zita Santos & Carlos Ribeiro
Metabolic reprogramming, dietary nutrients and food cravings in ovary aging
Call/Programme: NA
Active period: 01/08/20-01/02/23

Cancer Research UK

Carlos Ribeiro (Project head PI: Julia Cordero, University of Glasgow)
Drosophila as a model to study mechanisms of cancer-driven behavioural changes
Call/Programme: Pioneer Award
Active period: 2019-2021

Chan Zuckerberg Initiative

Henrique Veiga-Fernandes
Coordination: Harvard Medical School
Unraveling Neuro-immune Interactions at the Single Cell Level
Call/Programme: Chan Zuckerberg Initiative DAF
Active period: 01/09/20-31/08/22

European Crohn's and Colitis Organisation

Roksana Pirzgalska (Veiga-Fernandes lab); ECCO (European Crohn's and Colitis)
A neuroepithelial approach to inflammatory bowel disease
Call/Programme: ECCO Grant
Active period: 01/06/21-31/05/22

European Commission – Horizon 2020

Gonzalo de Polavieja (Polavieja lab)
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

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

Nickolas Papanikolaou
Coordination: IDRYMA Tecnologias Kai Erevas – 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

Gonzalo de Polavieja
Coordination: Proyectos 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

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
Circuit mechanisms of self-movement estimation during walking
Call/Programme: ERC-2017-STG
Active period: 01/11/17-30/04/24

Bruno Costa-Silva (Coordinated by: STICHTING VUMC)
European Liquid Biopsies Academy – Towards widespread clinical application of blood-based diagnostic tools
Call/Programme: H2020-MSCA-ITN-2017
Active period: 01/01/18-30/09/22

Susana Lima
Hypothalamic Circuits for the Selection of Defensive and mating Behaviour in Females
Call/Programme: ERC-2017-COG
Active period: 01/03/18-28/02/23

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 & Nickolas Papanikolaou (Coordinated by: HELSINGIN JA UUDENMAAN SAIRAANHOITOPIIIRIN KUNTAYHTYMA – HUS. *Coordinator at CCU: Fatima Cardoso)
Predicting Effective Adaptation to Breast Cancer to Help Women to BOUNCE Back
Call/Programme: H2020-SC1-2017-CNECT-2
Active period: 01/11/17-30/04/22

Albino Oliveira-Maia (Coordinated by: 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: 01/01/20-30/06/23

Michael Orger
Whole-brain circuits controlling visuomotor behavior
Call/Programme: ERC-2017-COG
Active period: 01/02/18-31/01/23

Michael Orger (Coordinated by: Institut du Cerveau et de la Moelle Epiniere – ICM)
Zebrafish Neuroscience Interdisciplinary Training Hub (ZENITH)
Call/Programme: H2020-MSCA-ITN-2018
Active period: 01/10/19-30/09/23

Joe Paton
Basal ganglia circuit mechanisms underlying dynamic cognitive behavior
Call/Programme: ERC-2017-COG
Active period: 01/04/18-01/04/23

Noam Shemesh
Sensing activity-induced cell swellings and ensuing neurotransmitter releases for in-vivo functional imaging sans hemodynamics – DIRECT-fMRI
Call/Programme: ERC-2015-STG
Active period: 01/03/16-31/08/21

Zachary Mainen
Modulation of cortical circuits and predictive neural coding by serotonin – 5HTCircuits
Call/Programme: ERC-2014-ADG
Active period: 01/01/16-31/12/21

Henrique Veiga-Fernandes
Glia-derived factors in innate lymphoid cell sensing and intestinal defence
Call/Programme: ERC-2014-CoG
Active period: 01/06/17-31/12/21

European Commission – Marie Skłodowska-Curie Actions

Susana Lima
Anatomical and functional characterization of the neural circuits controlling ejaculation
Call/Programme: H2020-MSCA-IF-2017-799973-SEG
Active period: 01/06/20-31/05/22

European Foundation for the Study of Diabetes & Novo Nordisk

Roksana Pirzgalska (Veiga-Fernandes lab)
A neuroepithelial circuit responsible for intestinal metabolism
Call/Programme: EASD Rising Star Symposium and EFSD Rising Star Fellowship
Active period: 01/06/21-31/05/22

European Molecular Biology Organization (EMBO)

Bruno Costa-Silva
Project Title: Not applicable
Call/Programme: EMBO Installation Grants
Active period: 01/06/18-31/05/23

Fundação para a Ciência e a Tecnologia

Cristina João
Combined immUNotherapy/C 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

Joana Maia (Costa-Silva lab)
Unraveling the role of post-secretion protein interactions in tumor extracellular vesicles biogenesis (SecretEV)
Call/Programme: FCT 2021 PeX
Active period: 01/12/21-31/05/23

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

João Marques
How does the Mauthner array generates sequences of escapes (FishEscape)
Call/Programme: FCT 2021 PeX
Active period: 01/01/22-30/06/23

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

Daniela Pereira
Addressing striatal plasticity at the single synapse level upon motor learning (SPLASSYM)
Call/Programme: FCT 2021 PeX
Active period: 01/01/22-30/06/23

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

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

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

Rita Fior
Ovarian Cancer Avatarsfor 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

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

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

Adriana Sánchez-Danés
Comparing pediatric and adult cancer progression and therapy response (CancerPediAdult)
Call/Programme: SR&TD Project Grants
Active period: 01/01/21-31/12/23

David Brea-López (Veiga-Fernandes lab)
Regulation Of Intestinal Immunity by brain-derived Signals
Call/Programme: SR&TD Project Grants
Active period: 01/03/21-29/02/24

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

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

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

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

Catarina Brás (Moreno lab)
The role of healthy cThe 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

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

Megan Carey
The nature of error signals during locomotor learning
A natureza dos sinais de erro no cerebelo durante a aprendizagem locomotora
Call/Programme: 02/SAICT/2017
Active period: 01/10/28-31/07/22

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

Bruno Costa-Silva
Coordination: Rui Oliveira, Fundação Calouste Gulbenkian
Developmental and transgenerational effects of oxytocin-like peptides on social behavior: an eco-evo-devo approach using zebrafish as a model
Call/Programme: 02/SAICT/2017
Active period: 14/06/18-13/06/21

Bruno Costa-Silva
Coordination: Maria Paula Macedo, Universidade Nova de Lisboa
Metabolic chronic diseases stratification: a case for gut-liver axis derived exosomes.
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/22

Bruno Costa-Silva
Coordination: Rune Matthiessen, Universidade Nova de Lisboa
Estratificação de exossomas de linfoma difuso de grandes células B
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/21

Cristina João
(Co-PI: Bruno Costa-Silva)
The role of metastatic microenvironment in Multiple Myeloma extramedullary disease.
(EMphAsIS: Extramedular Myeloma microenvironment Study)
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/22

Rita Fior
Zebrafish patient derived xenografts to predict anti-cancer drug response for personalized medicine
Call/Programme: 02/SAICT/2017
Active period: 01/10/19-30/09/22

Christian Machens & Alfonso Renart
Robustness and Energy-Efficiency of Spiking Neural Networks
Call/Programme: 02/SAICT/2017
Active period: 14/06/18-13/06/21

Bassam Atallah (Mainen lab)
Spatial Attention: dissecting the cortical and subcortical circuitry during rapid routing of sensory information
Call/Programme: 02/SAICT/2017
Active period: 01/06/18-31/05/22

Eran Lottem (Mainen lab)
Serotonergic Control of Decision-Making and Impulsivity
Call/Programme: 02/SAICT/2017
Active period: 01/09/18-30/06/22

Cindy Poo (Mainen lab)
Odores e Memória: Odors and memory: neural mechanisms for encoding contextual information in olfactory cortex
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/22

Zachary Mainen
Neural mechanism of value based decision making of staying or leaving – Deciding when to initiate locomotion to move to the next reward location
Call/Programme: 02/SAICT/2017
Active period: 03/10/18-31/07/22

Albino Oliveira-Maia (PI)
(Co-PI: Zachary Mainen)
Cognitive flexibility, cortical excitability and antidepressive effect of psilocybin
Call/Programme: 02/SAICT/2017
Active period: 03/10/18-30/09/22

João Corrêa (Oliveira-Maia lab)
Obsessive-compulsive disorder and reinforcement learning: exploring the role of the orbitofrontal cortex
Call/Programme: 02/SAICT/2017
Active period: 01/06/18-31/05/22

Ana Fernandes (Oliveira-Maia lab)
From the Vagus Nerve to the Ventral Tegmental Area: A pathway for post-ingestive food reinforcement in the development and treatment of obesity
Call/Programme: 02/SAICT/2017
Active period: 01/08/18-31/12/21

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

Michael Orger (Co-PI)
(PI: Rui Oliveira, Fundação Calouste Gulbenkian)
Developmental and transgenerational effects of oxytocin-like peptides on social behavior: an eco-evo-devo approach using zebrafish as a model
Call/Programme: 02/SAICT/2017
Active period: 14/06/18-13/06/21

Michael Orger
Whole-brain mechanisms of operant learning in zebrafish: cells, circuits and behaviour
Call/Programme: 02/SAICT/2017
Active period: 17/07/18-16/01/22

Nickolas Papanikolaou (Co-PI)
(PI: Leonardo Vanneschi, Universidade Nova de Lisboa)
Improving Bio-Inspired Deep Learning for Radiomics
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/07/22

Leopoldo Petreanu
Cortical circuits for sensory expectations
Call/Programme: 02/SAICT/2017
Active period: 14/06/18-13/06/21

Christa Rhiner
Molecular mechanisms of adult neural stem cell activation following brain injury in Drosophila
Call/Programme: 02/SAICT/2017
Active period: 01/08/18-28/02/22

Carlos Ribeiro
Microbiome, nutrients and the brain: Identifying the molecular programs underlying the impact of essential amino acids and the microbiome on brain function
Call/Programme: 02/SAICT/2017
Active period: 17/07/18-16/03/22

Zita Santos (Ribeiro lab)
Call/Programme: Norma Transitória BPD
Active period: 2019-2024

Luísa Vasconcelos
Communication during courtship: the role of ovipositor extrusion
Call/Programme: 02/SAICT/2017
Active period: 01/07/18-31/12/21

Luísa Vasconcelos
The social fly: genetic architecture for social learning neural circuits in Drosophila melanogaster
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/21

Henrique Veiga-Fernandes
Circadian regulation of innate lymphoid cells
Call/Programme: 02/SAICT/2017
Active period: 14/06/18-13/06/22

Manuela Ferreira
(Veiga-Fernandes lab)
Role of diet-derived retinoids in natural intraepithelial lymphocytes and early-life intestinal immunity
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-18/02/21

Manuela Ferreira
(Veiga-Fernandes lab)
Coordination: Instituto Nacional de Saúde Doutor Ricardo Jorge, IP (INSA, IP)
Early-life exposure to MYCotoxins and its impact on health
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-31/05/22

Albino Oliveira-Maia
Coordination: University Hospital Wurzburg
Pathophysiology of dystonia – role of gene-environment interaction and common pathophysiological pathways (EurDyscover)
Call/Programme: ERA-NET call
"Transnational research projects to accelerate diagnosis and/or explore disease progression and mechanisms of rare diseases"
Active period: 01/07/20-30/06/23

Howard Hughes Medical Institute

Joe Paton
HHMI International Research Scholars Program 2017
Call/Programme: HHMI-International Research Scholars Program
Active period: 01/09/17-31/08/22

Kavli Foundation

Carlos Ribeiro
The microbial basis of feeding decisions
Call/Programme: The Kavli Foundation
Active period: 01/01/17-31/03/21

"la Caixa" Foundation

Henrique Veiga-Fernandes
Neurimm KISS – Unravelling pulmonary neuroimmune circuits during infection
Call/Programme: Health Research 2020 Call
Active period: 31/12/20-31/12/23

Mireia Castillo-Martin
Coordination: Arkaitz Carracedo, Asociación Centro de Investigación en Biociencias
Eradicating prostate cancer metastasis before clinical manifestation (HiddenMETs)
Call/Programme: "la Caixa" Health Research 2017 Call
Active period: 01/09/19-31/10/22

Bruno Costa-Silva
Coordination: Maria Abad, Centro Nacional de Investigaciones Oncológicas Carlos III
Defining the role of Exosome-Secreted Micropeptides in Pancreatic Cancer
Call/Programme: "la Caixa" Health Research 2018 Call
Active period: 15/09/19-31/01/23

Leopoldo Petreanu
Optical dissection of cortical circuits for sensory expectations
Call/Programme: "la Caixa" Health Research 2017 Call
Active period: 01/12/18-01/12/22

Carlos Ribeiro
Identifying and testing the metabolites generated by two psychoactive gut bacteria to alter brain function and behavior
Call/Programme: "la Caixa" Health Research 2017 Call
Active period: 31/12/18-31/12/22

Liga Portuguesa Contra o Cancro

Rita Fior
Molecular mechanisms of innate immune evasion and rejection
Call/Programme: Liga Portuguesa Contra o Cancro – Núcleo Regional do Sul (Terry-Fox)
Active period: 20/04/18-19/03/21

Maratona da Saúde

Adriana Sánchez Danés
Pediatric brain tumors: deciphering the mechanisms leading to therapy resistance
Call/Programme: Prémios Maratona da Saúde 2019 – Investigação em Cancro
Active period: 01/10/20-30/09/22

Paul G. Allen Family Foundation

Henrique Veiga-Fernandes
Deciphering peripheral neuroimmune architecture by intercellular labelling
Call/Programme: Allen Distinguished Investigators Program
Active period: 15/12/18-30/11/22

Portugal 2020

Durval Costa
Coordination: Neadadvance
LyRaCAD.: Sistema CAD para análise de imagens PET/CT com FDG em linfomas – uma abordagem Radiomics
Call/Programme: 31/SI/2017
Active period: 12/08/19-11/08/22

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: Life Sciences – Simons Collaboration on the Global Brain Research Award
Active period: 01/07/17-30/06/23

Anne Churchland
(*Coordinator at CCU: Zachary Mainen)
Coordination: Cold Spring Harbor Laboratory
International Brain Laboratory (IBL)
Call/Programme: Life Sciences – Simons Collaboration on the Global Brain Research Award
Active period: 01/07/17-30/06/23

Megan Carey
Coordination: Emory University
Simons-Emory International Consortium on Motor Control
Call/Programme: Chief Scientist Fund-Targeted
Active period: 01/03/20-28/02/23

University College London/ Wellcome Trust

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

VAC-Associação Viver a Ciência

Rita Fior
Molecular mechanisms of innate immune evasion and recognition
Call/Programme: 10° Prémio Criostaminal 2017
Active period: 01/01/19-31/12/21

VolkswagenStiftung

Michael Orger
How spontaneous behaviour emerges from brain-wide neural network dynamics
Call/Programme: VWS-VolkswagenStiftung (Life)
Active period: 01/01/19-31/12/23

Individual Funding & Fellowships

Boehringer Ingelheim Fonds

Catarina Costa (Moreno lab)
Novel players involved in Flower-dependent cell competition
Call/Programme: PhD Fellowships
Active period: 01/06/20-31/05/22

Miguel Paço (Chiappe lab)
Finding the neuronal basis of Drosophila courtship chasing sensorimotor control
Active period: 01/01/20-31/12/21

Joaquim Contradanças (Orger lab)
Whole-brain mechanisms of operant learning in zebrafish: cells, circuits and behavior
Call/Programme: PhD fellowships
Active period: 01/01/20-31/12/21

Cancer Research Institute

Roeland Wolterink
(Veiga-Fernandes lab)
Deciphering the architecture and language of pulmonary neuroimmune communication
Call/Programme: CRI Irvington Postdoctoral Fellowship Program
Active period: 01/04/20-31/03/23

Erasmus University Medical Center

Ivo Marcelo
Neurobiology of social action
Call/Programme: ERASMUS MC
Active period: 01/10/14-30/06/21

European Commission – Marie Skłodowska-Curie actions

Alexandre Leitão (Moita lab)
The impact of genetic background during manipulation of neuronal activity (NeuroContext)
Call/Programme: H2020 MSCA Individual fellowships
Active period: 01/09/21-31/08/23

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: 01/09/21-31/08/23

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

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: 01/10/21-31/08/23

Constanze Lenschow (Lima lab)
Anatomical and functional characterization of the neural circuits controlling ejaculation
Call/Programme: H2020-MSCA-IF-2017
Active period: 01/06/20–31/05/22

Julia Huntenburg (Mainen lab)
Deciphering the effects of locus coeruleus activity on whole-brain dynamics and neurovascular coupling
Call/Programme: H2020-WF-01-2018
Active period: 01/10/19–31/01/21

Rui Simões (Shemesh lab)
Monitoring cancer heterogeneity based on the dynamic assessment of the Warburg effect under metabolic perturbation
Call/Programme: H2020-MSCA-IF-2018
Active period: 02/05/19–01/05/21

João Marques (Mainen lab)
Understanding how self-movement representations shape motor learning – FlyLearn'
Call/Programme: H2020-MSCA-IF-2019
Active period: 01/06/20–30/12/21

Lamiae Abdeladim (Petreanu lab)
Mesoscale holographic interrogation of visual circuits mediating predictive coding (HoloPredict)
Call/Programme: H2020-MSCA-IF/Global fellowships
Active Period: 01/09/20–31/08/23

European Commission – Widening Fellowships

Paavo Huoviola (Chiappe lab)
Active Sensation In Motor-control of Flies – ASIMOF
Call/Programme: H2020-WF-02-2019
Active period: 01/11/20–30/11/21

Ibrahim Tastekin (Ribeiro lab)
Dissecting how the Drosophila brain regulates behavioral sequences of feeding to ensure protein homeostasis
Call/Programme: H2020-WF-01-2018
Active period: 03/11/19–07/12/21

María Martínez López (Veiga-Fernandes lab)
Commensal microbiota regulation of neuro-immune networks
Call/Programme: H2020-WF-01-2018
Active period: 01/09/20–31/10/22

European Molecular Biology Organization (EMBO)

María Martínez López (Veiga-Fernandes lab)
Commensal microbiota regulation of neuro-immune networks
Call/Programme: Long-Term fellowships
Active period: 01/09/19–31/08/21

Marko Sestan (Veiga-Fernandes lab)
It takes two for tango: Neuroimmune regulation of metabolic homeostasis
Call/Programme: Long-Term fellowships
Active period: 01/03/20–28/02/22

Fundação para a Ciência e a Tecnologia

Filipa Barahona (João lab)
COMPASS: COntribution of non-invasive biomarkers for Multiple myeloma Prognosis ASsessment.
Call/Programme: 2021 FCT PhD Research fellowships
Active period: 01/10/21–30/09/25

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

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

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

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

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

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

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

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

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

Raquel Lopes (João lab)
Unic.MM – Combined immUNOtherapeutiC approach for targeting bone marrow microenvironment in Multiple Myeloma
Call/Programme: 2020 FCT PhD Research fellowships
Active period: 01/01/21–31/12/24

Joaquim Alves da Silva (Oliveira-Maia lab)
Disentangling cued from self-paced actions in corticostriatal circuits
Call/Programme: Individual Call to Scientific Employment Stimulus 3rd Edition – Junior Researcher
Active period: 01/09/21–31/08/26

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

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

Diana Frasquilho Guerreiro (Oliveira-Maia lab)
MoodUp: A digital platform to accelerate access to Mental Health care for cancer patients amid COVID-19 pandemic
Call/Programme: Apoio Especial RESEARCH 4 COVID-19
Active period: 09/07/20–09/05/21

Hugo Marques (Carey lab)
The nature of error signals in locomotor learning
Call/Programme: 2016 Postdoctoral fellowships
Active period: 01/09/17–31/08/23

Andreia Maia (Castillo-Martin lab)
Expansion of Natural Killer cells as a complementary approach for adoptive cell therapy in advanced Colorectal Cancer (NKAT-CRC)
Call/Programme: 2019 PhD fellowships
Active period: 01/01/20–31/12/23

Nuno Rito (Chiappe lab)
Neural basis of a visually guided oriented behavior in Drosophila melanogaster
Call/Programme: 2017 PhD fellowships
Active period: 01/08/18–31/07/22

Daniela Pereira
Call/Programme: Individual Call to Scientific Employment Stimulus
Active period: 01/06/19–31/05/25

Ana Carolina Marques (Costa-Silva lab)
Nanobiosensing platform based on MIP-SERS for breast cancer exosome characterization and detection
Call/Programme: 2016 PhD fellowships
Active period: 09/01/17–31/08/21

Vanda Póvoa (Fior Lab)
Dissecting intra-tumour clonal dynamics and its cross-talk with the microenvironment in a zebrafish xenograft model
Call/Programme: 2016 PhD fellowships
Active period: 31/01/17–28/02/21

María Martínez López (Fior Lab)
Zebrafish Avatars as a model for chemotherapy and immunotherapy response in bladder cancer
Call/Programme: IGC-IBB PhD programme
Active period: 01/03/18–01/03/22

Dário Sarra (Mainen lab)
Serotonin modulation circuitry of patience and impulsivity
Call/Programme: 2017 PhD fellowships
Active period: 01/01/18–31/12/21

Kcénia Bourgrova (Mainen lab)
The serotonergic-medial prefrontal cortex circuits underlying action decisions
Call/Programme: 2019 PhD fellowships
Active period: 01/01/20–31/12/23

Matheus Farias (Moita lab)
On the mechanisms by which descending neurons control defensive behaviors of fruit flies
Call/Programme: 2017 PhD fellowships
Active period: 2018–2022

Mirjam Heinemans (Moita lab)
Social modulation of defensive behaviours in Drosophila
Call/Programme: 2019 PhD fellowships
Active period: 2020–2024

Maria Bettencourt (Moreno lab)
The role of cell fitness in tumor progression and metastasis formation
Call/Programme: 2017 PhD fellowships
Active period: 01/01/18–31/12/21

Mariana Reis (Moreno lab)
Cell Competition in Drosophila organs: the effects of suboptimal cells accumulation and insights into the winner-loser communication in a competition scenario
Call/Programme: 2018 PhD fellowships
Active period: 01/01/19–31/12/22

Carolina Rodrigues (Moreno lab)
Unravelling the link between Cell Competition and Alzheimer's Disease
Call/Programme: 2018 PhD fellowships
Active period: 01/07/19–31/06/23

Gabriela Ribeiro (Oliveira-Maia lab)
Modulation of postingestive reward mechanisms by weight loss surgery
Call/Programme: 2017 PhD fellowships
Active period: 01/01/18–31/12/21

Gonçalo Cotovio (Oliveira-Maia lab)
Antidepressant mechanisms of psilocybin: from cortical excitability to brain functional connectivity
Call/Programme: 2017 PhD fellowships
Active period: 01/08/18–31/07/22

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

Lucas Martins (Orger lab)
Light-sheet imaging of functional networks underlying optic-flow processing in the zebrafish brain
Call/Programme: 2017 PhD fellowships
Active period: 01/08/18–31/07/22

Elena Hindinger (Orger lab)
The neural control of gait switching in larval zebrafish
Call/Programme: 2019 PhD fellowships
Active period: 01/01/20–31/12/23

Teresa Serradas Duarte (Paton lab)
Imaging the Neuronal Reorganization in a Sensitive Period of Heightened Plasticity
Call/Programme: 2016 PhD fellowships
Active period: 04/01/17–31/03/21

Filipe Rodrigues (Paton lab)
Disentangling cognitive & movement parameters in interval timing
Call/Programme: 2017 PhD fellowships
Active period: 01/08/18–31/07/22

Beatriz Belbut (Petreanu lab)
The functional coupling of cortico-cortical loops during behavior
Call/Programme: 2019 PhD fellowships
Active period: 01/08/20–31/07/24

Anabel Rodrigues (Rhiner lab)
Molecular Mechanisms of Neural Stem Cell Activation following Brain Injury in Drosophila melanogaster
Call/Programme: 2016 PhD fellowships
Active period: 03/01/17–28/02/21

Rita Figueiredo (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

Manuela Ferreira (Veiga-Fernandes lab)
Role of diet-derived retinoids in natural intraepithelial lymphocytes and intestinal defence
Call/Programme: Investigador FCT 2015
Active period: 01/01/17–31/12/21

Cristina Godinho Silva (Veiga-Fernandes lab)
Control of innate lymphoid cells by circadian clock signals
Call/Programme: 2016 Individual Postdoctoral fellowships
Active period: 03/01/17–28/02/23

Manuela Ferreira (Veiga-Fernandes lab)
Exploratory Research Project
Call/Programme: Programa Investigador FCT
Active period: 20/12/16–19/12/21

Miguel Rendas (Veiga-Fernandes lab)
Regulation of innate lymphoid cells by circadian cues
Call/Programme: 2017 PhD fellowships
Active period: 01/01/18–31/12/21

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

Fulbright Portugal

Andreia Maia (Castillo-Martin lab)
NK Cell Gene Manipulation and Therapy
Call/Programme: Fulbright fellowship with the support of FCT, Fundação Luso-Americana para o desenvolvimento (FLAD) and QuantOCancer
Active Period: 2022 (Jan-Oct)

Gilead Sciences

Cristina João (João lab)
Exploring the bone marrow microenvironment communication via extracellular vesicles in an immunocompetent multiplemyeloma mouse models and its potential translation to human disease
Call/Programme: Gilead GENESE 2019
Active period: 25/11/20–24/11/21

Human Frontier Science Program

Constanze Lenschow (Lima lab)
Anatomical and functional characterization of the neural circuits controlling ejaculation
Call/Programme: HFSP Postdoctoral fellowships
Active period: 01/07/18–31/08/22

Camille Mazo (Petreanu lab)
Do cortical feedback connections store statistical knowledge of the environment?
Call/Programme: HFSP Postdoctoral fellowships
Active period: 31/03/19–30/09/22

Davide Reato (Renart lab)
Role of neuronal spontaneous activity for sensory processing
Call/Programme: 2016 Individual Postdoctoral fellowships
Active period: 03/01/17–28/02/21

"la Caixa" Foundation

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

Adrien Jouary (Orger lab)
The latent dynamic underlying visually driven behavior
Call/Programme: Júnior Leader PosDoc fellowships
Active period: 01/09/20–31/08/23

Esha Madan (Moreno lab)
Study of Deptor-mir181d axis in human breast cancer
Call/Programme: Programa de bolsas pós doutorais Júnior Leader
Active period: 01/09/20–31/08/23

Roel Wolterink (Veiga-Fernandes lab)
[Deciphering the architecture and language of pulmonary neuroimmune communication](#)
Call/Programme: Programa de bolsas pós doutorais Júnior Leader
Active period: 01/09/20–31/08/23

Andrada Ianus (Shemesh lab)
[MRI based mapping of microscopie brain composition in Alzheimer's disease](#)
Call/Programme: Programa de bolsas pós doutorais Júnior Leader
Active period: 01/09/20–31/08/23

Miguel Pinto (Moreno lab)
[Mechanical cell competition in health and disease](#)
Call/Programme: Doctoral INpHINIT Fellowships Programme
Active period: 30/11/20–29/11/23

The Federation of European Biochemical Societies

Ana Queirós (Moreno lab)
[Regulation of "fitness fingerprints" mediated cell competition](#)
Call/Programme: FEBS Long-Term Fellowships
Active period: 01/01/19–30/06/21

Educational Projects

BPI & "la Caixa" Foundation

Catarina Ramos (Project coordinator: TreeTree2)
[Aprender a Aprender: Laboratório de Metacognição, Neurociência e Machine Learning](#)
Call/Programme: Prémio BPI "la Caixa" Infância
Active period: 01/09/19–31/10/21

Fundação Calouste Gulbenkian

Catarina Ramos (Coordinator)
[Metodologias Experimentais](#)
Call/Programme: Academias Gulbenkian do Conhecimento
Active period: 19/10/18–18/10/21

Theses

PhD Theses

JANUARY
Raphael Steinfeld
[Auditory decision making in mice: Behavioural characterisation and neural correlates in auditory cortex](#)
Supervisor: Alfonso Renart

Inês Ferreira
[Extracellular vesicles: agents of gut communication in prediabetes scenario](#)
Supervisors: Maria Paula Macedo (NOVA Medical School) & Bruno Costa-Silva

MARCH
Allan Mancoo
[On the interpretation of higher-order principal components](#)
Supervisors: Christian Machens & Sophie Deneve (Ecole Normale Supérieure Paris)

APRIL
Annelene Dahl
[Anatomical and Functional Connectivity of the Rodent Hippocampal Formation](#)
Supervisors: Zachary Mainen & Clifford Kentros (Norwegian University of Science and Technology)

Francisco Romero
[Deep learning tools to study collective behaviour](#)
Supervisor: Gonzalo de Polavieja

MAY
Joana Maia
[Extracellular Vesicles: new population analysis methods and their roles as messengers in tumor-stroma communication](#)
Supervisors: Bruno Costa-Silva & Maria de Sousa (Weill Cornell Medicine NYC & University of Porto)

JUNE
Hedi Young
[Laminar-specific cortico-cortical loops in mouse visual cortex](#)
Supervisor: Leopoldo Petreanu

JULY
Susana Valente
[Behavioral and endocrinological investigation of male sexual behavior](#)
Supervisor: Susana Lima

NOVEMBER
Silvana Araújo
[Unraveling the activity patterns of midbrain dopaminergic neurons during male sexual behaviour](#)
Supervisor: Susana Lima

Eliane Ochôa Carvalho
[Novel circuits involved in Drosophila melanogaster virgin female sexual behaviours](#)
Supervisor: Maria Luísa Vasconcelos

DECEMBER
Dario Sarra
[The role of prefrontal cortex and serotonin in foraging decisions](#)
Supervisor: Zachary Mainen

Ana Carolina Marques
[Nanobiosensing Platforms With Sers And MIP-Based Technologies](#)
Supervisors: Elvira Fortunato (Universidade NOVA de Lisboa) and Bruno Costa-Silva

Master's Theses

JANUARY
Íris Isabel Damião
[Weber's Law and movement-correlates of decision confidence in human decision making](#)
Supervisors: Alfonso Renart & Alexandre Andrade (University of Lisbon)

Rita Alves
[Mapping Microstructural Dynamics in a Mouse Stroke Model Using Advanced Diffusion MRI](#)
Supervisor: Noam Shemesh

FEBRUARY
Raquel Braga
[Maps of absorbed dose in patients undergoing PET/CT scans with 18FDG](#)
Supervisors: Paulo Ferreira (Costa lab) & Ricardo Vigário (NOVA University)

Joana Morgado
[Absorbed dose maps of patients submitted to 68Ga-PSMA-II PET/CT](#)
Supervisors: Paulo Ferreira (Costa lab) & Ricardo Vigário (NOVA University)

Marta Lopes da Costa
[Characterising novel regulators of injury-induced neural progenitor activation in the adult fly brain](#)
Supervisor: Christa Rhiner

APRIL
Margarida Caio
[Characterization of newly formed neurons and functional regeneration in a Drosophila model of regenerative neurogenesis](#)
Supervisor: Christa Rhiner

MAY
Mariana Barroso
[Establishment of pancreatic cancer zebrafish xenografts for personalized medicine in oncology practice](#)
Supervisor: Rita Fior

JUNE
Carolina Pestana
[Study of biomarkers in Multiple Myeloma: a statistical approach for longitudinal assessment of extracellular vesicles and its prognostic value](#)
Supervisors: Lisete Maria Ribeiro de Sousa (Lisbon University) & Cristina João

JULY
Madalena Valente
[Deep Learning for Multi-Animal Tracking"](#)
Supervisors: Gonzalo de Polavieja & Raquel Conceição (University of Lisbon)

Juliana Couras
[A Theory of Spike Coding Networks with Heterogeneous Postsynaptic Potentials](#)
Supervisors: Christan Machens & Alexander Goltsev (Universidade de Aveiro)

SEPTEMBER
Carolina Duro
[Unravelling the input/output logic of the ventral premammillary nucleus of the hypothalamus](#)
Supervisor: Susana Lima

Daniel Rodrigues da Silva
[The efficacy of Psychological interventions for depression in oncological context: A network Metanalysis](#)
Supervisor: Jaime Grácio (Oliveira-Maia lab)

OCTOBER
Catarina Alexandra Carvalho
[Evolutionary machine learning in Radiomics: A case study on breast cancer](#)
Supervisors: Nuno Lourenço (University of Coimbra), Nickolas Papanikolaou & Prof Leonardo Vanneschi (NOVA IMS Research and Development Center)

NOVEMBER
Cristiana Rodrigues
[Comparison of Two 177Lu-DOTATATE Quantification Methods for Patient Personalized Dosimetry in Therapy of Neuroendocrine Tumors](#)
Supervisors: Luis Peralta (LIP/FCUL) & Paulo Ferreira (Costa lab)

Vânia Nunes
[Voltage dynamics and statistics in balanced networks](#)
Supervisors: Christian Machens & Rui Dilão (IST Lisboa)

Ana Carolina Rodrigues
[Prostate MRI Radiomics for Prediction of Gleason Score](#)
Supervisors: Nickolas Papanikolaou & Francisco Moreira Couto (University of Lisbon)

Erik Cardoso
[Studying the role of Survivin in Basal Cell Carcinoma initiation](#)
Supervisor: Adriana Sánchez-Danés

DECEMBER
Cátia Rebelo
[Do MHC Class I Negative Tumour Cells Display the Cancer Stem Cell Property of Chemoresistance? Unravelling a Potential Surface Marker on Colorectal Cancer Stem Cells](#)
Supervisors: Mireia Castillo-Martin & Cecília Rodrigues (Universidade de Lisboa)

Ana Raquel Borralho
[Unravelling the importance of MHC class I in colorectal cancer cell stemness and tumour initiation](#)
Supervisors: Mireia Castillo-Martin & Paula Soares (Universidade do Porto)

Maria Inês Ribeiro
[Dynamics of motor memory consolidation in the cerebellum](#)
Supervisor: Megan Carey

Pedro Castelhanito
[Identifying behavioral modulation in cerebellar Purkinje cells](#)
Supervisor: Megan Carey

Agenda

CISS: Champalimaud Internal Seminar Series

BBIS: Brain-Body Interactions Seminar

January

04 CISS
Silvia Batista
[Exosomes as biomarkers of pancreatic cancer detection and progression](#)

11 CISS
Maria Luísa Vasconcelos | Marta Neto
[The intricacies of courtship: on persuasion and acceptance](#) | [Metabolic changes regulating adult neural progenitors proliferation](#)

11 BBIS
Ryusuke Niwa
(University of Tsukuba)
[Neuroendocrine control of female germline stem cell increase in Drosophila melanogaster](#)

18 CISS
Dennis Goldschmidt | Ana Fernandes
[A neural substrate for balancing nutrient exploration-exploitation trade-offs in Drosophila](#) | [VTA dopamine responses to intragastric delivery of nutrients](#)

19 CONGENTalk
Cláudia Campos
(Metabolic Cage System Manager @IGC)
[The mouse reality show: metabolism analysis equipment at IGC](#)

22 Thesis Defence
Raphael Steinfeld
[Auditory decision making in mice: Behavioural characterisation and neural correlates in auditory cortex](#)

25 CISS
Diogo Duarte
[Decoding locomotor kinematics from cerebellar population recording.](#)

25 BBIS
Katerina Akassoglou
(Gladstone Institute for Neurological Disease)
[Neurovascular Interactions: Mechanisms, Imaging, Therapeutics](#)

February

01 CISS
Matheus Farias | Filipe Rodrigues
[Neural substrates of freezing behaviour in flies](#) | [Using temperature to analyse the neural basis of a latent temporal decision](#)

01 BBIS
Alia Crum
(Stanford University)
[Harnessing Mindset in 21st Century Healthcare](#)

02 CoLife Microscopy Course
Davide Accardi | Telmo Pereira (CEDOC) | José Rino (IMM)
[Know your microscope: Objective lenses, optical resolution and sampling principle](#) | [Introduction to Fluorescence Microscopy and light detectors](#) | [Confocal Microscopy and Optical Sectioning](#)

04 CoLife Microscopy Course
Pedro Pereira (ITQB-NOVA) | Hugo Botelho (FCUL) | Gabriel G Martins (IGC)
[Super-Resolution flavours at COLife](#) | [High-throughput microscopy & screening](#) | [Mesoscopy/large-scale imaging & tissue clearing](#)

08 CISS
Hedi Young | Andreia Maia
[Laminar-specific cortico-cortical loops in mouse visual cortex](#) | [Expansion of cytotoxic NK cells from PBMCs using individualized cytokine combinations](#)

15 BBIS
Micah Allen
(Aarhus University)
[Towards better interoceptive biomarkers in computational psychiatry](#)

18 Clinical Seminar
Thiago Carvalho | Fatima Cardoso | Cristina João
[COVID-19 – Impact on Cancer Patients](#)

22 CISS
Raquel Jacinto & Joaquim Contradanças | Miguel Rendas
[Larval zebrafish as a model to study striatal output pathways: First steps](#) | [Regulation of tissue physiology by Circadian Immune Circuits](#)

22 BBIS
Anna Malofsky
(University of California, San Francisco)
[Microglia, memories, and the extracellular space](#)

March

01 CISS
Miguel Paço | João Santinha
[Towards an Understanding of the Control of High-performance Chasing Behaviour in Drosophila](#) | [AI in oncology imaging: tackling the challenges to deliver on its promises](#)

01 BBIS
Kara Marshall
(Scripps Research)
[Under Pressure: the role of PIEZO ion channels in interoception](#)

08 CISS
Constanze Lenschow | Ana Rita Mendes
[Anatomical and functional characterization of the neural circuits controlling ejaculation](#)

15 CISS
Tor Stensola | Mafalda Valente
[Odor response dynamics in predictive settings](#) | [Identifying the functional elements of a brain circuit for perceptual decisions using optogenetics: a roadmap](#)

16 CONGENTalk
Catarina Carmo (IGC)
[Mechanisms of interaction between Wolbachia and Drosophila](#)

22 CISS
Ricardo Matias
[Home-based kinematics for clinical monitoring: applications in Parkinson's disease](#)

22 BBIS
John F. Cryan
(University College Cork)
[Gut Feelings: The Microbiota-Gut-Brain Axis Across the Lifespan](#)

24 QuantoCancer Webinars
Sabine Oertelt-Prigione (Radboud UMC)
[Sex and Gender Dimensions in Research](#)

29 CISS
Sara Cascais
[Molecular phenotyping of prostate cancer microenvironment](#)

29 BBIS
Daniela Carnevale
(Sapienza University of Rome)
[Neuroimmune interactions in Cardiovascular Diseases](#)

April

01 Postdoc Candidate Talk
Caroline Haimerl (New York University)
[Targeted comodulation supports flexible and accurate decoding](#)

05 BBIS
Dragana Rogulja
(Harvard Medical School)
[Sleep and the gut](#)

12 CISS
Ana Queiros | Noam Shemesh
[Molecular mechanisms driving cell competition in a colon cancer in vitro model](#) | [Enhancing Stroke Detection using Correlation Tensor MRI](#)

12 BBIS
Douglas A. Bayliss
(University of Virginia)
[The retrotapezoid nucleus: an integrative and interoceptive hub in neural control of breathing](#)

14 Seminar
Matt Smear
(University of Oregon)
[Active Olfaction by Mice](#)

19 BBIS
Supriya Srinivasan
(Scripps Research)
[Communication between the brain and the gut: Learnings from C. elegans](#)

20 Seminar
Heike Stein
(École Normale Supérieure)
[From NMDAR Hypofunction in Working Memory to Cerebellar Population Codes During Motor Learning](#)

22 CONGENTO – Champalimaud LAS (Animal use) Course

23 Thesis Defence
Annelene Dahl
[Anatomical and Functional Connectivity of the Rodent Hippocampal Formation](#)

26 CISS
Kristin Fisher
[Enteric Neuroimmune Regulation of the Host Metabolism](#)

28 Thesis Defence
Francisco Romero
[Deep learning tools to study collective behaviour](#)

29 Seminar
Anthony Butler
(MARS Bioimaging)
[MARS 3D spectral imaging: a novel approach to an old problem](#)

May

03 CISS
Dario Sarra | Margarida Caio
[A pathway to persistence: maturation of top-down control over the dorsal raphe nucleus](#) | [Probing diversity and function of reactive neurogenesis in the fly adult brain](#)

03 BBIS
Christoph Scheiermann
(Lmu Munich & Université De Genève)
[Sympathetic control of lymph node function](#)

05 3RD FLxFLOW Course – Open Webinar
Andy Filby
(Newcastle Flow Cytometry Core Facility)
[Fluorochromes – Brightness, Detection and Resolution](#)

10 CISS Webinar
Mert Erginkaya | Andrada Ianus
[Visual motion processing in the fly central brain](#) | [Mapping apparent soma and neurite density in the in-vivo mouse brain](#)

12-13 Workshop
[Cool Tools for Science – 2nd Edition](#)

17 CISS
Emilie Carneiro | Allan Mancoo
[Extracellular vesicles' proteins as non-invasive biomarkers for Multiple Myeloma](#) | [Curved manifold for neural representations in the lateral-intraparietal \(LIP\) cortex](#)

17 BBIS
Camilla Nord
(University of Cambridge)
[The translational potential of body-brain interactions for mental health treatment](#)

24 CISS Webinar
Mauricio Toro | Elena Hindinger
[Context dependent anticipation and action signalling by basal ganglia output and thalamic circuits](#) | [Neural control of gait switching in larval zebrafish](#)

25 CONGENTalk
Nuno Henrique Franco (i3S)
[The win-win-win-win scenario of a Culture of Care for animal research](#)

31 CISS
Coralie Hérent | Inês Laranjeira
[Respiratory adaptation to running: behavior and neuronal circuits in mice](#) | [Variability in learning across laboratories of the International Brain Lab – a study case](#)

31 BBIS
Manuel Tena-Sempere
(University Of Córdoba)
[Brain-body interactions in the metabolic/nutritional control of puberty: Neuropeptide pathways and central energy sensors](#)

June

02 AD_HOC seminar
Stefan H. E. Kaufmann
(Max Planck Institute)
How to combat the most successful pathogen on earth: Rational design of novel intervention measures against tuberculosis

07 CISS
Mafalda Valente
Investigating the role of auditory cortex on decisions about sound lateralization

07 BBIS
Kevin Mann
(Stanford University)
Causal coupling between neural activity, metabolism, and behavior across the Drosophila brain

14 CISS Webinar
Carolina Gorgulho
A Response to the Coronavirus Pandemic: different flavors of T cell responses against SARS-Cov-2

14 BBIS
Clemence Blouet
(University of Cambridge)
Central representations of protein availability regulating appetite and body weight control

14-15 Course
Methods and Models in Biomedical Research: Building Bridges

21 CISS
Carolina Rodrigues | Daniel Münch
The role hFWE isoforms in Drosophila models | Distinct internal states interact to shape food choice by modulating sensorimotor processing at global and local scales

21 BBIS
Beth Stevens
(Harvard Medical School)
Neuro-Immune Coupling: How the Immune System Sculpts Brain Circuitry

22 CONGENTalk
Joana Carvalho
RNAscope[®]: What? When? How?

25 Thesis Defence
Hedi Young
Laminar-specific cortico-cortical loops in mouse visual cortex

28 BBIS
Sir Stephen O'Rahilly
(University of Cambridge)
Some new insights into the central sensing of nutritional state and somatic stress

July

01 CR Colloquia
Katherine Nagel
(NYU School of Medicine)
Separation of value and direction computations in olfactory navigation

05 CISS
Mayra Martinez-Lopez
Exploring the oldest cancer immunotherapy (BCG) using zebrafish

05 BBIS
Sebastien Bouret (Inserm)
Importance of perinatal hormones and diet on hypothalamic development and lifelong metabolic regulation

12 BBIS
Amita Sehgal
(University of Pennsylvania)
Why we all need a good night's sleep

15 CR Colloquia
Arif Hamid
(Brown University)
Dopamine waves as a mechanism for spatiotemporal credit assignment

19 BBIS
Lora Heisler
(University of Aberdeen)
Targeting the brain to improve obesity and type 2 diabetes

29 CR Colloquia
Benjamin Beck
(Université Libre de Bruxelles)
Plasticity of esophageal cells: insight into metaplasia

September

10 Workshop
ISMRM 2021 Workshop on Kidney MRI Biomarkers

13 CISS
Raquel Silva | Camille Mazo
Postingestive reinforcement in obesity and bariatric surgery | Improving idtracker.ai using pairwise information

13 BBIS
Staci Bilbo
(Duke University)
Microglia, microbes, and development: implications for neurodevelopmental disorders

16 Course
BRA1.0 – Breast Cancer Reconstruction Art

20 CISS
Gabriela Ribeiro | Francisco Heras, Francisco Romero-Ferrero, Tiago Costa & Madalena Valente
Postingestive reinforcement in obesity and bariatric surgery | Improving idtracker.ai using pairwise information

20 BBIS
Soyoung Q Park
(Institute of Human Nutrition)
Motives and modulators of human decision making

22-24 Course
COLife Microscopy Course 1

27 CISS
Razvan Sandru | Julia Elzanowska
What does the R in VR stand for? | Are IFN- γ Extracellular Vesicles mediators of immunotherapy resistance?

27 BBIS
Andrea Calixto
(Universidad de Valparaíso)
Microbiota in the health of the nervous system and the response to stress

30 CR Colloquia
Arkaitz Carracedo
(CIC bioGUNE)
Metabolic and signalling processes at the core of prostate cancer

October

04 CISS
Joana Carvalho
Mapping large scale plasticity of the rat visual pathway

04 Seminar
Champalimaud-ALBA networking social at ECNP

08 Seminar
4th virtual dissemination event of the European Project BOUNCE

08 OpenDay
Open Day Unidade de Mama.

11 BBIS
Ken Loh
(The Rockefeller University)
Sympathetic nerve remodeling in adipose tissue

13-15 Conference
Champalimaud Research Symposium '21 – Dialogues on Neural and Machine Intelligence

18 CISS
Bertrand Lacoste
VTA dopamine neurons and male sexual behaviour

18 BBIS
Marcelo Dietrich
(Yale School of Medicine)
The development of hunger

21 CR Colloquia
Kareem Azab
(Washington University)
3D Tissue-Engineered Bone Marrow Culture as a Tool to Predict Patient Response to Therapy in Multiple Myeloma and Other Hematologic Malignancies

22 Workshop
Science Career Workshop

25 CISS
Teru Fujiwara | Marta Moita
Neural mechanisms of flexible motor control | Overview of the lab's approach to the study of defensive behaviours

25 BBIS
Jeffrey Iliff
(University of Washington)
Evidence for the role of glymphatic dysfunction in the development of Alzheimer's disease

November

04 CR Colloquia
Filip Swirski
(Icahn School of Medicine at Mount Sinai)
Connecting the Dots: Stress, Sleep, the Brain, and the Blood

08 CISS
Severin Berger | João Santinha
Efficient coding and higher-order brain function. | Imaging Biomarkers for Oncology – Bridging the gap from research to the clinics

08 BBIS
Kevin J. Tracey
(Feinstein Institutes, Northwell Health)
Reflex Regulation of Innate Immunity

12 Thesis Defence
Eliane Carvalho
Novel circuits involved in Drosophila melanogaster virgin female sexual behaviours

15 CISS
Gili Ezra | Bruna Costa
How does a need turn to a "want" | Zebrafish Avatars towards personalized therapy in colorectal cancer

15 BBIS
Coleen Murphy (Princeton University)
Adapt or Die: Transgenerational Inheritance of Pathogen Avoidance (or, How getting food poisoning might save your species)

15-19 Course
ZENITH training @ CCU

22 CISS
Pedro Silva & Aaron Ostrovsky | Cristiana Rodrigues
A tale of two fish: A comparative approach in vertebrate neuroscience | Comparison of Two ¹⁷⁷Lu-DOTATATE Quantification Methods for Patient Personalized Dosimetry in Therapy of Neuroendocrine Tumors

22 Thesis Defence
Silvana Araújo
Unravelling the activity patterns of midbrain dopaminergic neurons during male sexual behaviour

22 BBIS
Felice Jacka (Deakin University)
Nutritional psychiatry: diet and mental health over the lifecourse

25 CONGENTalk
Joana Bom (IGC)
Life in a bubble: The axenic/ gnotobiology service @ IGC

29 CISS
Miguel Gaspar | Tiago Costa
Aggressive Behavior in Female Drosophila | Puppet or puppeteer? Temporal reversals in the temporal lag between neural activity and behavior in the mouse prefrontal cortex

29 BBIS
Javier Apfeld (Northeastern University)
Worms use their brain to regulate their behavior and physiology to deal with the lethal threat of hydrogen peroxide

29-30 Conference
DrosTuga 2021

December

06 CISS
Miguel Pinto | Raquel Lopes
Finding novel mechanical cell competition regulators | Unraveling the crosstalk between multiple myeloma and the bone marrow microenvironment: A role for myeloma-derived extracellular vesicles?

13 CISS
Jéssica Kamiki | Anabel Rodríguez
MALT cells in epithelial cancer | Secreted factors modulating damage-induced proliferation in the adult fly brain after traumatic injury

13 Thesis Defence
Dario Sarra
The role of prefrontal cortex and serotonin in foraging decisions

17 CONGENTalk
Nuno Silva (NMS) | Ana Cristina Borges (IGC)
A Dietary Cholesterol-Based Intestinal Inflammation Assay for Improving Drug-Discovery on Inflammatory Bowel Diseases

January

04 Ar Magazine Article
“Why do males have to wait for “round 2”? The reason may be different from what we think.”
Online

16 Scientific and Technological Workshop
Metamorphosis 2nd Edition
Online

23 Talk
Fórum Nacional Clubes Ciência Viva na Escola – “Voltas e Reviravoltas do Método Científico”
Online

26 Video
Zoom-in episode 1
Online

February

05 Ar Magazine Article
“Imaging of a living brain can help clearly differentiate between two types of dementia”
Online

09 Ar Magazine Article
“Sensitivity to sweet taste predicts the amount of weight loss that will be induced by stomach surgery to treat obesity”
Online

11 Video
International Day of Women and Girls in Science – “Science & Curiosity: it’s a love affair”
Online

11 Social Media Campaign with Animated Illustrations
International Day of Women and Girls in Science
Online

11 Webinar with Q&A
COVID-19 and Cancer – “Impacto da COVID-19 nos doentes oncológicos”
Online

19 Ar Magazine Article
“Good Cop, Bad Cop: What can zebrafish tell us about immune-cancer relations?”
Online

24 Webinar with Q&A
“Science Collection – Inside the Unknown” featured at the JRC Portuguese Semester
Online

March

10 Video
Zoom-in episode 2
Online

18 Ar Event
“Psychedelics – Tripping into the Unknown” | 2021 Brain Awareness Week
Online

25 Award ceremony. Webinar with Q&A
CEO team wins the 2021 Accessible Language Award from Acesso Cultura
Online

April

06 Webinar with Q&A
Launch event of the campaign about COVID-19 vaccines “Conversas com Cientistas: Décadas de Ciência para Dias de Vacinas”
Online

06-May 14 Education Programme
LaMAA vai à Escola
Escola Básica Damião de Góis, Lisboa

20 Ar Magazine Article
“Sexual receptivity and rejection may be orchestrated by the same brain region”
Online

20-30 400 Webinars with Q&A
Campaign about COVID-19 vaccines “Conversas com Cientistas: Décadas de Ciência para Dias de Vacinas”
Online

May

04 Video
Zoom-in episode 3
Online

12 Social Media Campaign with Editorial Photography
“Ser enfermeiro faz parte de mim” | International Nurses Day
Online

16 Social Media Campaign with Animated Illustrations
“The five stages of grief – a failed experiment” | National Scientist Day
Online

26-27 & June 4, 11, 15 Education Programme. Seminars
Ciência di Noz Manera – Phase 1
Escola Pedro d’Orey da Cunha, Amadora

June

04 Video
Zoom-in episode 4
Online

12, 19 & 26 / July 3, 10, 17 & 24 Education Programme
LaMAA meets After School
Online

17 Ar Event
“Unpacking bias: perspectives from neuroscience and social psychology”
Online

24-July 16 Education Programme
“Neuronautas: Voo Longo” – Academia Gulbenkian do Conhecimento
Online

28-July 9 Education Programme
“Neuronautas: Voo Curto” – Academia Gulbenkian do Conhecimento
Online

July

01 Ar Magazine Article
“If you think you’re not even a tiny bit racist... think again”
Online

14 Video
Zoom-in episode 5
Online

August

13 Video
Zoom-in episode 6
Online

18 Ar Magazine Article
“Scientists decipher how neuroimmune interactions burn deep fat”
Online

26 Video
Zoom-in episode 7
Online

September

09 Ar Magazine Article
“Flies in a VR world reveal how vision affects locomotion”
Online

13 Social Media Campaign with Animated Illustrations
Launch of the printed CR 2020 Annual Report
Online

16 Ar Magazine Article
“Learning to see the world through a physician’s eyes”
Online

22 School Class. Workshop
“Playing with the brain” (Kindergarten) and “The Brain: Let’s talk about my favourite part of the body!” (Grade 5)
United Lisbon International School (ULIS)

October

07 School class. Workshop
“Playing with the brain” (Grade 1) and “The Brain: Let’s talk about my favourite part of the body!” (Grade 3)
United Lisbon International School (ULIS)

08 Social Media Campaign with Animated Illustrations
“The Good, the Bad & the Future” | World Mental Health Day
Online

12 Video
360° VR Tours | An inside look into Champalimaud Research
Online

27 Ar Magazine Article
“Taking the pulse of flies”
Online

27 Video
Science Snapshot “Danger in a heartbeat”
Online

November

03 School Visit to the CCU
Visit from Medical Biotechnology and Drug Development students from US Universities
CCU

24 Video
“Ser Cientista” | Science and Technology Week
Online

25 Webinar with Q&A
“Ciência Viva Clubs” | Science and Technology Week
Online

27 Art & Science
“Science on the Walls” | Science and Technology Week
Junta de Freguesia das Águas Santas, Cova da Moura, Amadora

December

10 Ar Magazine Article
“Ana Luisa Correia – Putting theory to the test”
Online

10 Ar Magazine Article
“Daniel McNamee – Keeping dormant cancer cells asleep”
Online

15-16 Education Programme. Workshops
Ciência di Noz Manera – Phase 2
Escola Pedro d’Orey da Cunha, Amadora

16 Scientific and Technological Workshop
Metamorphosis 3rd Edition
Online

22 Ar Magazine Article
“Follow your nose”
Online

22 Video
Science Snapshot “A scent of space”
Online

31 Video
Zoom-in episode 8 “The Reunion”
Online

Get in touch

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