Champalimaud Research

Annual Report 2020

Champalimaud Research
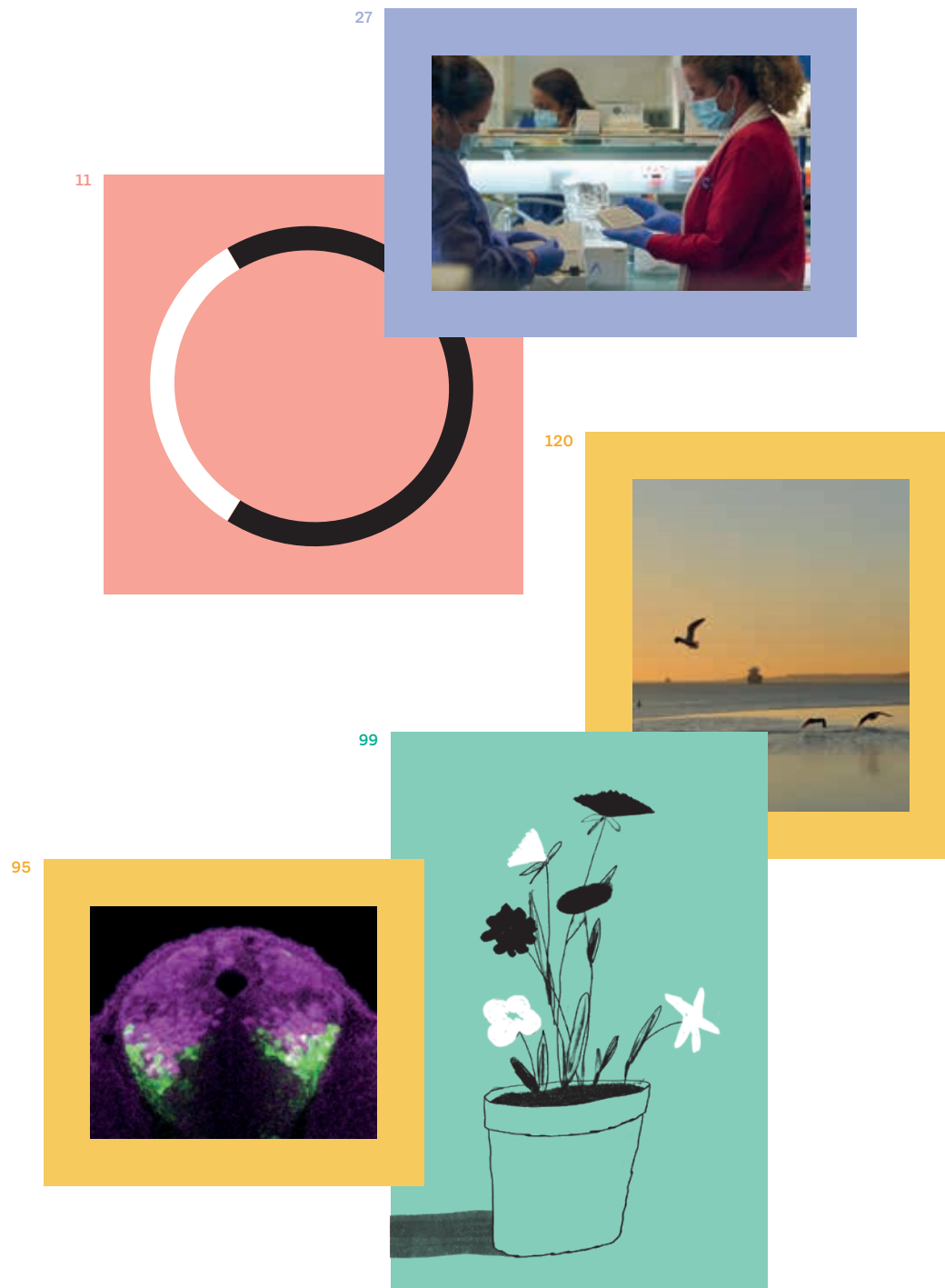
Annual Report   **2020**

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Champalimaud Foundation

Through scientific breakthroughs and clinical developments, the Champalimaud Foundation is there to help those who need it most
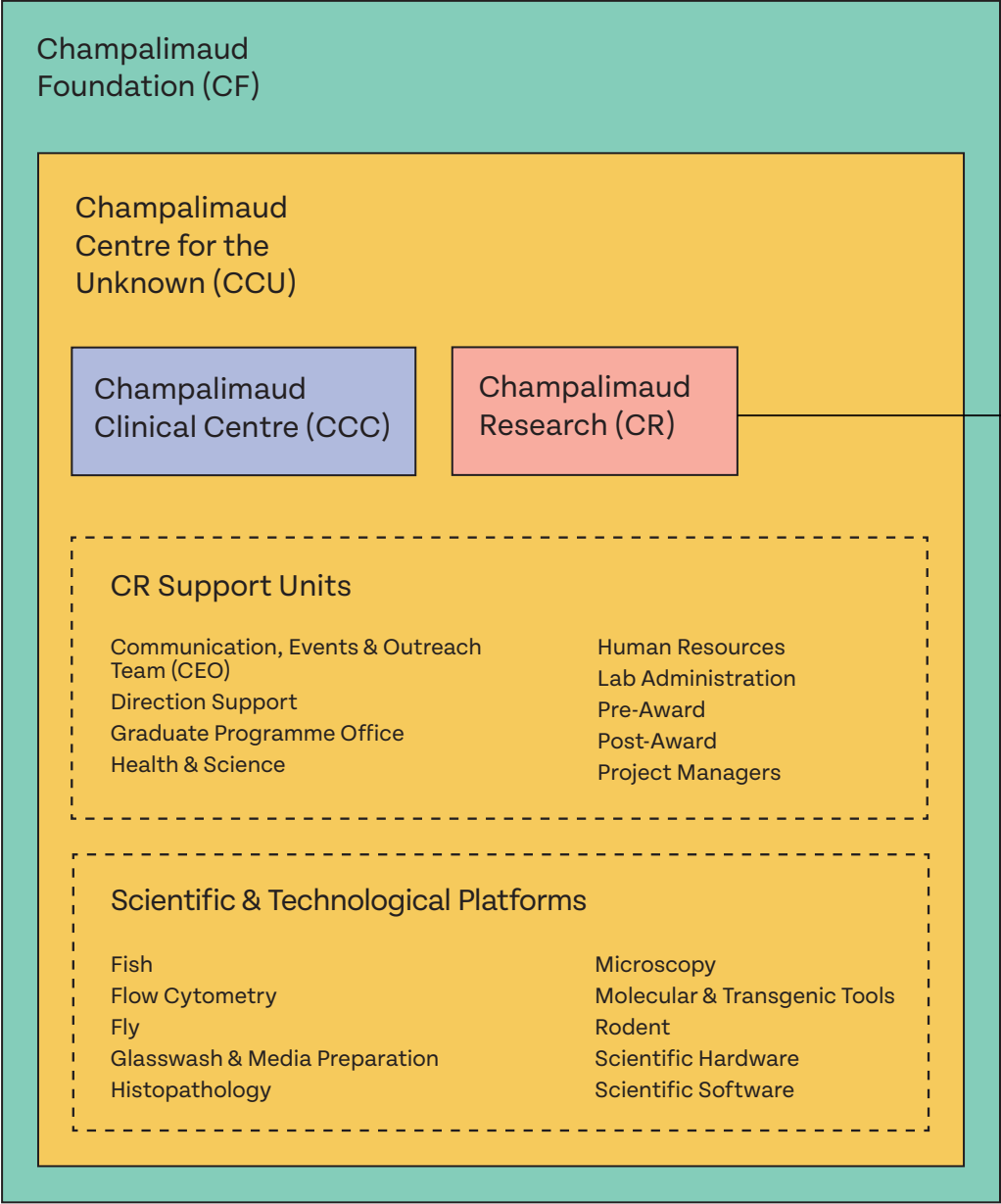
António de Sommer Champalimaud, a Portuguese entrepreneur and industrialist, in his will, charted a path for the establishment of an institution of excellence and a worldwide reference for research and clinical care, under the guidance of Leonor Beleza as its President.

Since 2005, hundreds of researchers, support staff, physicians and other healthcare professionals have undertaken this mission. At the Champalimaud Centre for the Unknown, the members of the Champalimaud Research Programme and the Champalimaud Clinical Centre (CCC), work together to investigate fundamental biological processes and search for effective solutions to alleviate the burden of oncological, neurological and mental diseases, while providing state-of-the-art care to the patients of the CCC.
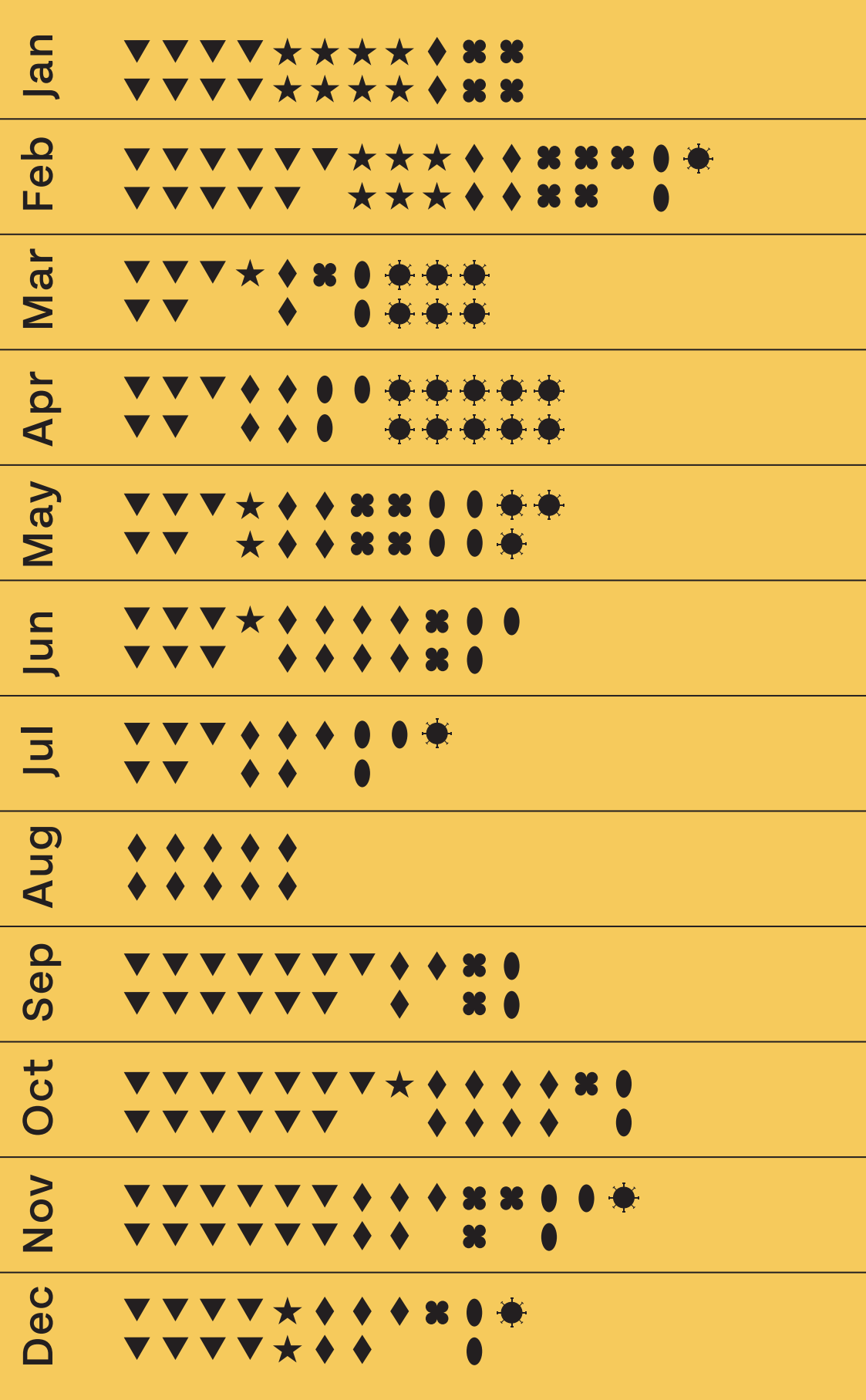
2020 was a challenging year, where exceptional circumstances forced a quick, efficient and safe adaptation of our work practices so that the impact of COVID-19 would be minimised. Throughout the year, the clinical and research communities have proved their resilience, maintaining their tireless work providing the best possible cancer care and advancing on all fronts of scientific research – fundamental, translational and clinical.

One of the important realisations that have emerged during these unprecedented times, is that scientific breakthroughs and collaborative efforts can lead to extraordinary and world-changing accomplishments. The Champalimaud Foundation is proud to be part of a global scientific community that, when circumstances call, comes together for the benefit of everyone.

Structure

Champalimaud Foundation (CF)

Champalimaud Centre for the Unknown (CCU)

Champalimaud Clinical Centre (CCC)

Champalimaud Research (CR)

CR Support Units

Communication, Events & Outreach Team (CEO)
Direction Support
Graduate Programme Office
Health & Science

Human Resources
Lab Administration
Pre-Award
Post-Award
Project Managers

Scientific & Technological Platforms

Fish
Flow Cytometry
Fly
Glasswash & Media Preparation
Histopathology

Microscopy
Molecular & Transgenic Tools
Rodent
Scientific Hardware
Scientific Software

Champalimaud Research

Direction Team

Celso Matos, Henrique Veiga-Fernandes, Joe Paton

Neuroscience Groups

Behaviour & Metabolism
Behavioural Neuroscience
Circuit Dynamics & Computation
Collective Behaviour
Cortical Circuits
Learning
Neural Circuits & Behaviour
Neurobiology of Action
Neuroethology
Sensorimotor Integration
Systems Neuroscience
Theoretical Neuroscience
Vision to Action

Research Associates

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

Adjunct Labs

Intelligent Systems
Social Neuro Endocrinology

Visiting Scientists

Cognitive-Motor Interface

Experimental Clinical Research Groups

Cancer Development & Innate Immune Evasion
Computational Clinical Imaging
Immunotherapy / ImmunoSurgery
Molecular & Experimental Pathology
Myeloma Lymphoma Research
Neuropsychiatry
Preclinical MRI
Radiopharmacology

Physiology & Cancer Groups

Cancer & Stem Cell Biology
Cell Fitness
Immunophysiology
Stem Cells & Regeneration
Systems Oncology

Education

Direction
Coordination
Teaching Lab
Education & Courses

CR SAB *	Graduate Programme SAB *

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

2020
Day by Day

2020 was a year unlike any other. We had to take it one day at a time, never sure if we'll be able to go to work or even leave our homes. So we've decided that the 2020 annual report will also be unlike its predecessors.

In this report, we'll travel through the year one day at a time. By following the twists and turns as they happened, we were heartened to see how even though many things have changed, others, despite everything, stayed the same.

▼	★	◆	✖	❘	✳
Events	Culture	Publications	Outreach	Funding	COVID-19

01
**The Year
Begins at CR ★**

06
**Champalimaud
Internal Seminar
Series (CISS) ▼**
Mauricio Toro (Learning lab),
Andrada Ianus (Preclinical
MRI lab)

**Charity
Bake Sale ★**
For: Dinis

09
Colloquium ▼
Stein Aerts (VIB-KU Leuven
Center for Brain & Disease
Research). Deciphering gene
expression programs using
single-cell genomics and
deep learning

10
CR Happy Hour ★
By: the Neuroethology
& Vision to Action labs

13
CISS ▼
Anna Hobbiss (Behavioural
Neuroscience lab), Marcelo
Mendonça (Neurobiology
of Action lab)

**The CR
Community
in Numbers**
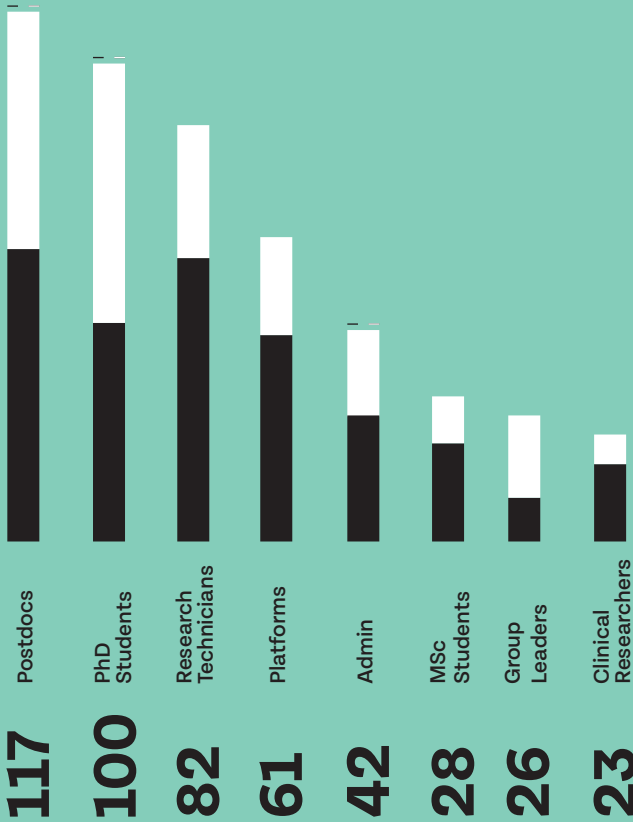
Culture ★

39 **NATIONALITIES**

4	Angola	11	France	4	Poland
1	Argentina	11	Germany	322	Portugal
1	Austria	4	Greece	3	Romania
1	Belgium	7	India	1	South Africa
6	Brazil	1	Iran	27	Spain
2	Canada	1	Ireland	3	Switzerland
3	Cape Verde	5	Israel	1	Taiwan
1	Chile	11	Italy	4	The Netherlands
2	Colombia	1	Jamaica	4	Turkey
1	Croatia	1	Japan	10	United Kingdom
1	Czech Republic	1	Mauritius	14	United States
1	Ecuador	2	Norway	2	Venezuela
1	Finland	1	Philippines	1	Vietnam

479
CR MEMBERS

Postdocs **117**
PhD Students **100**
Research Technicians **82**
Platforms **61**
Admin **42**
MSc Students **28**
Group Leaders **26**
Clinical Researchers **23**

FEMALE 283
MALE 193
NON-BINARY 3

157
Non-Portuguese

322
Portuguese

Poté et al. ♦

The histone acetyltransferase hMOF promotes vascular invasion in hepatocellular carcinoma. Liver International.
(Cancer Development & Innate Immune Evasion lab)

13
Almeida et al. ♦

Quantification of tumor burden in multiple myeloma by atlas-based semi-automatic segmentation of WB-DWI. Cancer Imaging.
(Computational Clinical Imaging group and the Myeloma Lymphoma Research group)

16
PhD Defence ▼

Nuno Loureiro (Neurobiology of Action lab). Operant EEG-based BMI: learning and consolidating device control with brain activity

17
CR Happy Hour ★

By: the Neuroethology & Vision to Action labs

20
CISS ▼

Megan Carey (Neural Circuits & Behaviour lab), André Marques and Wynne Stagnaro (Sensorimotor Integration lab)

22
Movie Nights at CCU ★

Film: Parasite

23
Colloquium ▼

Anne Von Philipsborn (Aarhus University). Female copulation song is modulated by seminal fluid

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Publications ♦
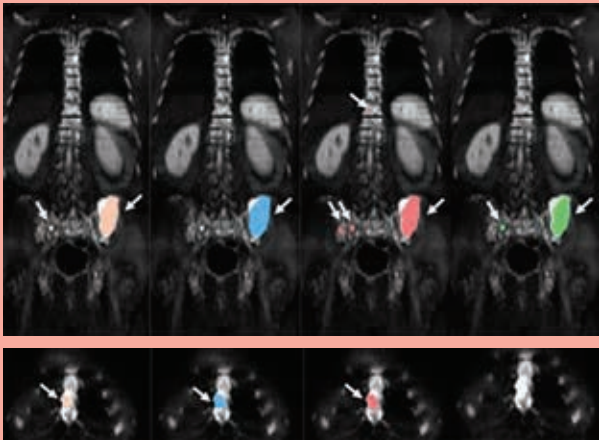
New Algorithm Facilitates Multiple Myeloma Diagnosis

Whole-body diffusion weighted imaging has proven value to detect multiple myeloma lesions. However, the large volume of imaging data and the presence of numerous lesions makes the reading process challenging. In this study, the Computational Clinical Imaging Group and the Myeloma Lymphoma

Research Group present a new semi automatic algorithm that provides equally reproducible segmentation results when compared to the manual segmentation of radiologists. This new method may therefore aid accurate assessment of tumour burden.

Film & Discussion ✖
ProjectAr: Tomorrow

24
Workshop ✖

Neuronautas – A case study of the Academias Gulbenkian do Conhecimento (Instituto Universitário de Lisboa)

Workshop ✖

Laboratório de Metacognição: Aprender a Aprender (LaMAA) 1st edition – closing session (Instituto Superior Técnico)

CR Happy Hour ★

By: the Neuroethology & Vision to Action labs

Outreach ✖

ProjectAr – Screening a Better Tomorrow

ProjectAr is a spin-off of the outreach initiative Ar | Respire connosco. This decade-old initiative was created by a group of scientists and science communicators at the CCU. Through the years, the Ar Team has been exploring science with the public from different angles and formats. This time, it has crossed science with cinema! ProjectAr | Watch – Talk – Act events begin with a film's screening, which then evolves into an open conversation, hopefully leading to positive action.

The second ProjectAr event brought over 200 participants to the CCU Auditorium

for a special screening of the French documentary "Tomorrow". Released in 2015, this documentary exposes creative and exciting examples of people trying to change the future of humanity and the environment.

Following the film, representatives from local and global initiatives presented their work. These initiatives included our own Green Team @CCU, É P'ra Amanhã, Caravana Agroecológica, Zero waste lab, Coopérnico, and others. Placing a spotlight on these initiatives created an opportunity for future engagement with these or related ones.

27
CISS ▼
Sander Keemink (Theoretical Neuroscience lab), Lucas Martins (Vision to Action lab)

28
High School Visit ✖
Escola Secundária Rocha Peixoto (Póvoa do Varzim)

29
Presentation ★
Green Team at Compromisso Lisboa Capital Verde Europeia 2020

30
Colloquium ▼
Robert Froemke (NYU School of Medicine). Social transmission of maternal behavior via oxytocin and synaptic plasticity

31
CR Happy Hour ★
By: the Neuroethology & Vision to Action labs

Culture ★

Green Team

Solving the climate crisis requires action and behaviour-change in our workplace: hospitals and laboratories are significant consumers of water and producers of waste. The Green Team is a grassroots movement of CCU staff motivated to reduce waste production, as well as energy and water consumption, thus reducing the adverse environmental impacts of our work.

In January 2020, the CF was one of 200 institutions in Lisbon who signed, with Lisbon's Municipality, the Lisbon European Green Capital 2020 Commitment – Climate Action Lisbon 2030, pledging to develop more sustainable ways of working. Inspired by this institutional commitment, the Green Team worked towards decreasing the energy consumption within the Research labs, improving the conditions for bicycle users and reducing food waste in our cafeteria, amongst other pro-environment initiatives.

Despite the disruption caused by the pandemic, the Green Team continued to reach out to the, now scattered, CCU community, increasing its membership to over 100 members and improving the communication of GT initiatives by creating a dedicated website and sharing tips for more environmentally-friendly working practices, even for those in remote work.

CF President Leonor Beleza at the Lisbon European Green Capital 2020 Commitment ceremony, introducing the Green Team plans for the year.

01
Workshop ✖
Metamorfoses (Pavilhão do Conhecimento)

03
CISS ▼
Pietro Vertechi and Fanny Cazettes (Systems Neuroscience lab), Mario Aguilar (Cell Fitness lab)

Charity Bake Sale ★
For: Água que Salva Vidas

04
PhD Defence ▼
Roberto Medina (Circuit Dynamics & Computation lab). Optimal Decision Making for Temporally Extended Actions

06
Colloquium ▼
Vera Gorbunova (University of Rochester). Mechanisms of longevity and cancer resistance in long-lived mammals

05
"Beat Cancer and Infections" ☀
Initiative announced through a correspondence publication in the Lancet

07
Cruz et al. ◆
Freezing Displayed by Others Is a Learned Cue of Danger Resulting from Co-experiencing Own Freezing and Shock. Current Biology. (Behavioural Neuroscience lab)

CR Happy Hour ★
By: the Circuit Dynamics & Computation and Behaviour & Metabolism labs

08
Henriques et al. ◆
Correlation tensor magnetic resonance imaging. Neuroimage. (Preclinical MRI lab)

10
CISS ▼
David Brea López and Roksana Pirzgalska (Immunophysiology lab)

11

Meet a Theorist Seminar and Nano Course ▼

João Xavier (Instituto Superior Técnico, IST, Lisbon). Algorithms That Learn from Distributed Datasets

Vertechi et al. ♦

Inference-Based Decisions in a Hidden State Foraging Task: Differential Contributions of Prefrontal Cortical Areas. Neuron. (Systems Neuroscience lab)

### High School Visit ✖

Agrupamento de Escolas Ferreira de Castro (Oliveira de Azeméis)

12

Veraart et al. ♦

Nonivasive Quantification of Axon Radii Using Diffusion MRI. elife. (Preclinical MRI lab)

Mice "Detectives" Hint at How Humans Read between the Lines

Sherlock Holmes is perhaps the most famous example of the power of inference – using indirect evidence to reveal hidden truths. Understanding the neural basis of this sophisticated cognitive skill has been a long-standing challenge for neuroscientists. In this study, the Systems Neuroscience lab presents a way out of the crux with a clever experiment that comes in two flavours – human and mouse.
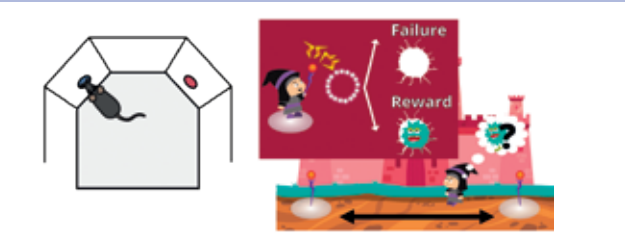
The team developed two tasks that can be solved using similar strategies: one for mice, where the animals search for water (reward) in two different locations in a box, and a video game where humans have to defeat an enemy (reward) that can be hidden in two different locations of a castle. Analysing the number of rewards and the changes between reward sites showed that both mice and humans learn to perform the task optimally.

MRI Method Provides Unprecedented Insight into the Brain's Wiring Network

Thoughts, sensations and emotions zap across the brain via a meshwork of fine nerve fibers called axons. Axon size is crucially important for general brain function as well as in certain neurological conditions. Experts have been striving to establish a means to non-invasively measure these fibers for many years. An international team, including the Preclinical MRI lab has now developed a novel MRI method that manages to do just that.
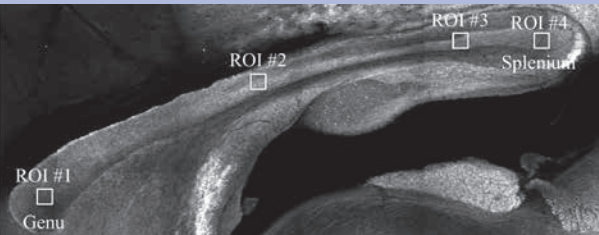

Image shows a rat's Corpus Callosum, which is a brain region rich in neural fibres (axons). The analysis in this research article focuses on different Regions of Interests (ROIs) within the Corpus Callosum.

Antonia Groneberg Wins Dance Your PhD Contest

In the winning video, produced over evenings and weekends with the support of volunteers from the CR Support and Research Groups, Groneberg and the pupils of her after-hours CR Dance Class, spin, wiggle and sway as they dance out the conclusions of her thesis work as a joint student at the Vision to Action and Collective Behaviour labs. According to one of the judges of the contest, the video "merged dance and science for an aesthetically stunning and intellectually profound masterwork of art ". Later in 2020, the work depicted in this video was published in the scientific journal Current Biology.
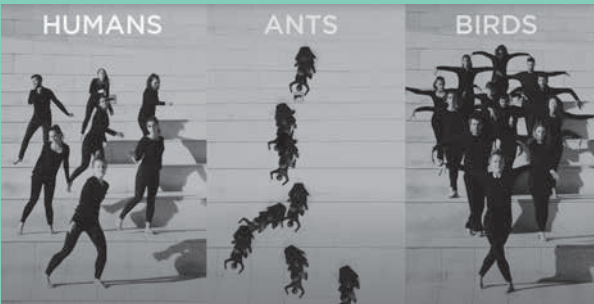
Storyboard: Antonia Groneberg (Vision to Action and Collective Behaviour labs), André Mendoça (CEO Team)
Camera and Editing: Alexandre Azinheira (CEO Team)
Motion Tracking: Alexandre Laborde (Vision to Action lab)
CR Dancers: Antonia Groneberg, Elena Hindinger and Pedro Tomás Silva (Vision to Action lab), Dario Sarra (Systems Neuroscience lab), Sebastián Malagon (Sensorimotor Integration lab), André Monteiro (Circuit Dynamics & Computation lab), Jovin Jacobs (Neural Circuits & Behaviour lab), Cristina Ferreira (Innate Behaviour group), Christa Rhiner (Stem Cells & Regeneration lab), Rita Saraiva, João Cruz and Simone Zacarias (CR Support Units)
External Dancers: Louise Lindblad, Tita Pardal, Margarida Garcia, Catarina Almeida, Tefy Sancho, Diogo Guerra, Dasha Smith
Little Dancers: Mana, Minho, Cá, Maddie, Sofia, Aurora, Kiko, Eduardo, Laura, Leo, Matteo

13

Colloquium ▼

Ginés Morata (Centro de Biología Molecular CSIC-UAM). Cell Competition and Tumorigenesis

PhD Defence ▼

Madalena Fonseca (Systems Neuroscience and Preclinical MRI labs). Serotonin, Impulsive Behaviour and Brain-Wide Networks

14

Video Contest ✖

Dance Your PhD

CR Happy Hour ★

By: the Circuit Dynamics & Computation and Behaviour & Metabolism labs

17

CISS ▼

Mirjam Heinemans (Behavioural Neuroscience lab), Cristina Ferreira (Innate Behaviour lab)

19

Movie Nights at CCU ★

Film: Jojo Rabbit

Culture ★

The Last Happy Hour of the Year

That Friday afternoon, just like in all those before it since the formation of CR in 2007, the community got together to socialise over chips, beer and pickled tremoços. Little did we know that just one week after, this casual scene would become unimaginable.

Working from Home

In March, we packed up our computers and headed home to create temporary working stations, which ended up being quite a bit more permanent than we had hoped. Though often invaded by kids or pets, these "home offices" kept us moving forward and connected throughout the rest of the year.

20
Colloquium ▼
Ivan de Araújo (Icahn School of Medicine at Mount Sinai). Reward, Aversion and the Gut-Brain Axis

21
CR Happy Hour ★
By: the Circuit Dynamics & Computation and Behaviour & Metabolism labs

23
Vaz et al. ▼
PSMA Expression in Thyroid Nodule. Revista Española de Medicina Nuclear e Imagen Molecular. (Molecular & Experimental Pathology lab)

24
Fundação para a Ciência e a Tecnologia (FCT) PhD Fellowship ◗
Rita Figueiredo (Behaviour & Metabolism lab)

27
Undergradute Students Visit ✖
Study Abroad Scandinavia

28
L'Oréal Portugal Medals of Honour for Women in Science ◗
Cristina Godinho-Silva (Immunophysiology lab)

Presentation ✖
PhD student Lucas Martins presents at the XV Encontro Nacional de Estudantes de Engenharia Biomédica. (Universidade de Aveiro)

CR Happy Hour ★
By: the Circuit Dynamics & Computation and Behaviour & Metabolism labs

02
CISS ▼
Leonor Morgado (Advanced BioImaging & BioOptics Experimental Platform), Bertrand Lacoste (Neuroethology lab)

03
Meeting ✖
PhD students Sofia Freitas, Lucas Martins and Gonçalo Guiomar participate in: VI Jornadas de Engenharia Física (Instituto Superior Técnico)

05
Colloquium ▼
Yael Niv (Princeton University). Model-Based Predictions for Dopamine

FCT PhD Fellowship ◗
Elena Hindinger (Vision to Action lab)

CR Virtual Scientific Events Platform

"It is fair to say that before the pandemic, video conferences were considered impractical and so, only used when strictly necessary. Suddenly, from one day to the next, we found ourselves with no other choice. The events agenda was put on hold, and together with the AVTech Support Team, we quickly established a Virtual Events Platform in order to keep the CR community connected internally as well as with the broad scientific community."
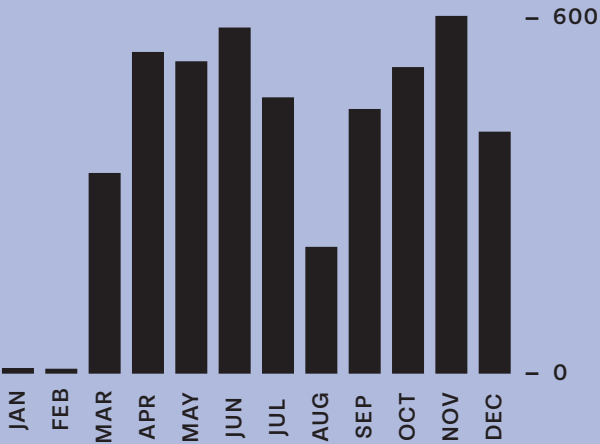
Scientific Events Coordinator: António José Monteiro

53
Countries

27929
PARTICIPATIONS

4751
Virtual Sessions

1560240 MIN ≈ 3 YEARS

05
Setting up Remote Contingency Plan for All Events ▼

CR Zoom platform is set up for remote meetings for the community

09
CISS ▼

Claudia Feierstein (Neural Circuits for Visuomotor Behaviour lab), Ana Gregório (Systems Oncology lab)

Three FCT PhD Fellowships ◖

Andreia Maia (Molecular & Experimental Pathology lab), Kcénia Bourgrova (Systems Neuroscience lab), Mirjam Heinemans (Behavioural Neuroscience lab)

11
All Platforms Communicate Preventive COVID-19 Measures ✱

13
Portugal Enters Lockdown ✱

16
First Online CISS ▼

Francisco Romero-Ferrero (Collective Behaviour lab)

The Champalimaud Internal Seminar Series (CISS)

CISS events are normally held at the CCU's Seminar Room, but this was the first CISS event ever to be held online. 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.

Learning to Represent Signals Spike by Spike

16
Brendel et al. ◆
Learning to represent signals spike by spike. PLOS Computational Biology. (Theoretical Neuroscience lab)

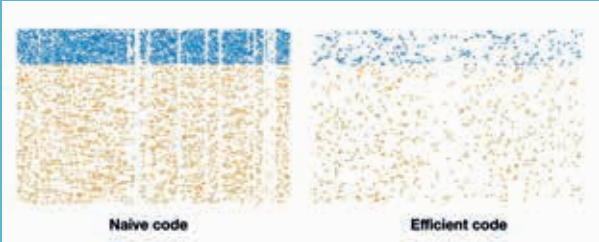Neurons in the brain are known to fire short electrical impulses (or "spikes") to communicate with each other. Individual neurons fire such spikes in an almost random manner, so that experimental observers are required to average over many observations in order to retrieve meaningful signals. For many decades, researchers have believed that neurons similarly need to average out the "noise" in order to retrieve the "signal". In this study, by the Theoretical Neuroscience lab, the team shows that this randomness could simply be the signature of a highly energy-efficient "neural code". Starting from first principles, the researchers mathematically derive rules by which neurons need to adjust the synapses that connect them in order to move into such a state.

17
Community Members Translate Governmental COVID Decrees ✸

18
Crowdfight COVID ☀
crowdfightcovid19.org website official launch

Naive code   Efficient code

COVID ✸

Pulling Together Scientific Resources to Battle against COVID-19

Crowdfight COVID-19 is a free service for COVID-19 researchers that aims to harness the huge pool of highly skilled scientists, willing to volunteer their time and expertise for fighting the pandemic. The basic idea is simple, but powerful – create a platform that will facilitate the process of matching resources with needs.

The platform was created by an international team, including several members from the Collective Behaviour lab, namely Gonzalo de Polavieja (Principal investigator), Francisco Romero (PhD student) and Francisco Heras (Postdoctoral researcher). These researchers used their skills in the field of AI development to work on the algorithms that match volunteers with requests by scientists.

crowdfight COVID-19

23
Moreira et al. ◆
Sexual imprinting overrides order effects during sampling of prospective mates. Current Biology. (Neuroethology lab)

25
**Launch of COLife Social Media Campaign ☀**

27
CR/Connect initiative ★

Tips for #covidDays ✸
The CEO Team prepared a document that gathered useful information and links for navigating the COVID-19 pandemic

Nature or Nurture?

How does the family environment shape a female's choice of a mate? To tackle this question, the Neuroethology lab conducted fostering experiments between closely related subspecies of mice, which can mate, but normally don't in the wild. Their results reveal that the family environment works to suppress the "primacy effect", which leads female mice to opt for the first male they come across as sexually mature adults, even if it's from the wrong subspecies. In other words, females undergo "sexual imprinting" in childhood that overrides the adult's primacy effect, thereby preserving the separation of the two subspecies.
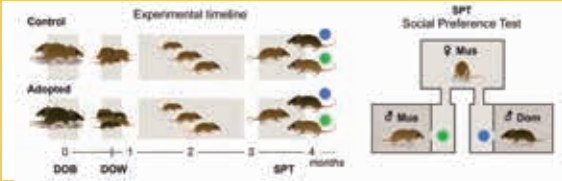
COVID ✸

The COLife Alliance

The CF is a part of COLife – an alliance between six research institutes in life sciences located in the region of Lisbon and Oeiras. In the context of the COVID pandemic, the "COLife – Sharing Information Together" campaign was launched with the goal of sharing credible information, in a dynamic, useful and accessible way.

COLife

Culture ★

CR/Connect

CR/Connect was launched by Tiago Quendera (PhD Student) and Zachary Mainen (Principal investigator) to keep the community connected during the pandemic. More than 100 participants joined over 20 individual groups on varied themes such as mental health and meditation to bread making, modelling, video-gaming and gardening.

01
Basti et al. ♦
The Core-Clock Gene NR1D1 Impacts Cell Motility In Vitro and Invasiveness in A Zebrafish Xenograft Colon Cancer Model. Cancers (Basel). (Cancer Development & Innate Immune Evasion lab)

02
Colloquium ▼
Discussion panel with Q&A – David Stern (Janelia Research Campus). Novel Aphid Proteins Mediate Plant Gall Development

Webinar ☀
COLife Sharing information together – Questions about COVID-19? Ask, the scientists will answer.

06
CISS ▼
Guido Meijer (Systems Neuroscience lab)

Fernandes et al. ♦
Postingestive Modulation of Food Seeking Depends on Vagus-Mediated Dopamine Neuron Activity. Neuron. (Neuropsychiatry Unit and Neurobiology of Action lab)

Competitive External Funding

Grants & Fellowships

April was one of the months with the highest number of newly awarded competitive external funding, the majority of which was attributed by the European Commission's Horizon 2020 Funding Scheme

In 2020, CR scientists received 9.6M€ in competitive external funds, these new projects join funds previously awarded and still running in 2020.

	6.65 M€	2.95 M€
	15	19
7	71	44
Institutional Grants	Grants*	Individual Funding & Fellowships

* Researcher-Initiated Grants
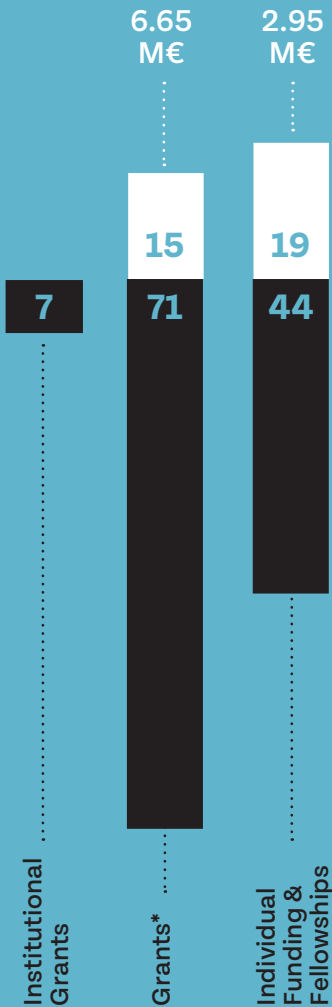
Horizon 2020

Between 2014 and 2020, CR investigators received significant support for their work from the European Commission's Horizon 2020 programme, across its three main pillars, as well as its specific objective Spreading Excellence and Widening Participation (SEWP), significantly contributing to the overall success of CF in this programme, which amounted to €30.84 M.

Excellent Science

30 projects

- 4 ERC Starting Grants
- 6 ERC Consolidator Grants
- 1 ERC Advanced Grant
- 3 ERC Proof of Concept Grants
- 13 Marie Skłodowska-Curie Actions Individual Fellowships
- 2 Marie Skłodowska-Curie Actions Innovative Training Network Grants
- 1 European Innovation Council Future and Emerging Technologies Grant

23.5 M€

Industrial Leadership

1 project

- 1 Multi-omics for genotype-phenotype associations Grant

0.7 M€

Societal Challenges

- 1 AI for Health Imaging Grant
- 1 Big Data and AI for Monitoring Health Status and Quality of Life after Cancer Grant

2 projects

1.7 M€

Specific Objective SEWP

- 1 ERA Chair Grant
- 5 Widening Fellowships

6 projects

3.2 M€

* Funding entries in the timeline section of the report are specified according to the official award date.

08
FCT PhD Fellowship ◖

Ana Maia (Neuropsychiatry Unit)

09
Tips for Dealing With Stress During the COVID-19 Pandemic ✺

Illustrated online article produced in collaboration between the Neuropsychiatry Unit and the CEO team

CR Mental Health Services ✺

Services available for CR members are extended to include additional measures put in place in the context of COVID-19

11
Palombo et al ♦

SANDI: A compartment-based model for non-invasive apparent soma and neurite imaging by diffusion MRI. Neuroimage. (Preclinical MRI lab)

14
Reis et al ♦

Negative affect and stress-related brain metabolism in patients with metastatic breast cancer. Cancer. (Radiopharmacology lab)

15
Four Marie Skłodowska-Curie Actions Individual Fellowships / Widening Fellowships ◖

Funding ◖

What Will Our New Fellows Be Working On?

In the project "MRI Based Mapping of Microscopic Brain Composition in a Mouse Model of Alzheimer's Disease", Andrada Ianus (Preclinical MRI lab) will combine state-of-the-art magnetic resonance imaging (MRI) and novel computational methods to identify imaging biomarkers for the early prediction of Alzheimer's Disease.

João Marques (Sensorimotor Integration lab) will investigate how the activity of neurons that integrate movement with visual information (called HS Cells) and serotonergic neurons change during motor learning, under the project

"Understanding How Self-Movement Representations Shape Motor Learning."

Developing technology to enable the manipulation of selected neurons in targeted visual brain areas with simultaneous measurements of neural activity throughout the visual hierarchy of the cortex is the goal of the project of Lamiae Abdeladim (Cortical Circuits lab), titled "Mesoscale holographic interrogation of visual circuits mediating predictive coding."

Paavo Huoviala (Sensorimotor Integration lab) will pursue the project "Active Sensation In Motor-control Of Flies" with the goal of assessing the behavioural capacities of flies and identify underlying visuomotor pathways.

CCU COVID-19 Test Lab

To ensure the safety of patients arriving at the Champalimaud Clinical Centre, as well as the safety of all CCU employees, the CCU COVID Test Lab was established through the collaboration of the Champalimaud Hospital Infection Control Committee and the Molecular & Transgenic Tools Platform. The Lab was certified by the National Health Institute Dr Ricardo Jorge on April 15th 2020 and began testing that same week. Having also participated in the first serological studies made in Portugal and contributed to the national effort to test nursing homes, the COVID testing laboratory has carried out, in 2020, more than 18400 RT-PCR tests, more than 4300 antigen tests and more than 5600 serological tests.

During its first few months of operation, the CCU COVID Test Lab was functioning thanks to a task force made up of volunteers from all across CR. Including individuals from several Scientific and Technological platforms, the CR Support Units and Investigators.

THANK YOU!

Scientific & Technological Platforms
· Ana Catarina Certal
· Ana Raquel Tomás
Alexandra Teixeira
Ana Cunha
Daniela Freire
Inês Marques
Inês Oliveira
Isabel Campos
João Baúto
Joana Gomes
Joana Monteiro
Kateryna Kholod
Madalena Martins
Maria Vito
Maria Inês Romano

Mariana Sampaio
Mariana Velez
Patricia Valentim
Patrick Teca
Pedro Garcia da Silva
Sara Ferreira
Sofia Silva
Soraia Rodrigues
Sergio Casimiro
Susana Dias

CR Support Units
António Raposo
Catia Feliciano
João Cruz
Laura Ward
Margarida Nunes
Rita Saraiva

CR Research Groups
· Henrique Veiga-Fernandes
· Mireia Castillo*
Adán Salas
Ana Paula Elias
Ana Queirós
Ana Rasteiro
Anabel Rodriguez
André Monteiro
Andrea Spinazzola
Andreia Maia
Anna Hobbiss
António Dias
Bruna Costa
Bruno Raposo
Carolina Alves
Catarina Brás Pereira
Catarina Pimentel

Cátia Almeida
Cátia Rebelo
Christian Bodo
Cristina Afonso
Cristina Chavarrías
Filipa Barahona
Frederico Severo
Helder Ribeiro
Joana Caetano
Julia Elzanowska
Julia Queiroz
Kristin Fischer
Luís Leite
Marcia Fontes
Maria Bettencourt
Ruth Diaz del Corral
Sandra Blasco
Sara Cascais
Susana Lima

· Coordination role
* Participated in conjunction with her role at the CCC

16
Webinar ✺

Discussion panel with Q&A – COLife Sharing information together – "How to access reliable information?"

17
CCU Test Lab Launches into Action ✺

20
CISS ▼

Georg Raiser (Learning lab)

Webinar ✺

Thiago Carvalho (Graduate Programme Coordinator) participated in Conferência FFMS "Assim fala a ciência. O que sabemos hoje?"

23
Colloquium ▼
Detlev Arendt (EMBL Heidelberg). Evolution of neurons and nervous systems

24
COLife Website Goes Live ☀
Launch of the COLife website with a section dedicated to scientific collaborative efforts

27
CISS ▼
Gonçalo Cotovio (Neuropsychiatry Unit)

FCT and European Commission Collaborative Grant ◖

28
CCU COVID-19 Test Lab @ Loulé County ☀
In collaboration with the Algarve Biomedical Center, the CCU Test Lab performed a three-day SARS-CoV-2 serological screening of the exposed population of Loulé County in Portugal

29
Webinar ☀
Discussion panel with Q&A – COLife Sharing information together "Let's talk about vaccines"

30
CCU COVID-19 Test Lab Collaborates in Nurse Study ☀
The Serological Screening study, performed in collaboration with "Ordem dos Enfermeiros", focused on the nurses of two public hospitals with high COVID-19 exposure (Hospital de Santo António in Porto and Hospital de Santa Maria in Lisbon)

Culture ★

Let's Dance!

To lift the spirits, the CEO Team prepared a dance video made up of contributions from CR members and their families.

04
CISS ▼
Beatriz Belbut (Cortical Circuits lab)

CR Dance Video ★

Portugal Exits Lockdown ☀

8
FCT PhD Fellowship ◖
Beatriz Belbut (Cortical Circuits lab)

11
CISS ▼
Terufumi Fujiwara (Sensorimotor Integration lab)

12
Pereira et al. ♦
Thalamic, cortical, and amygdala involvement in the processing of a natural sound cue of danger. PLOS Biology. (Behavioural Neuroscience lab)

14
Bordoni et al. ♦
An inflammatory profile correlates with decreased frequency of cytotoxic cells in coronavirus disease 2019. Clinical Infectious Diseases. (Immunotherapy / ImmunoSurgery lab)

Webinar ✖
Thiago Carvalho (Grad. Prog. Coord.) participates in: "Covid19 e Imunidade: o que sabemos e o que não sabemos." (Instituto Serrapilheira)

16
National Scientist Day 2020 ✖
Q&A with animations. Participants: Adriana Sánchez Danés (Cancer & Stem Cell Biology lab), Albino Oliveira-Maia (Neuropsychiatry Unit), Cristina Afonso (Neurobiology of Action lab), Cristina Godinho da Silva and Marko Šestan (Immunophysiology lab), Daniel Münch and Dennis Goldschmidt (Behaviour & Metabolism lab), Filipe Rodrigues (Learning lab), Gonzalo de Polavieja (Collective Behaviour lab), Rita Fior (Cancer Development & Innate Immune Evasion lab); Production: CEO team

17
Webinar ☀
Discussion panel with Q&A COLife Sharing information together – "Cientistas na era COVID19, entre o confinamento e a retoma"

Publications ♦

Social interaction

How do rats come to learn that when another rat freezes, it implies the presence of a threat? A series of experimental paradigms helps the researchers identify the key variables.

Learning What's Dangerous Is Costly, but Social Animals Have a Way of Lowering the Price

For social animals, such as humans, being able to recognise the presence of a threat in the behaviour of others could literally be a life-saver. Yet, animals do not always instinctively know that when a group member displays freezing – one of the three universal defence responses – it means trouble. In a pair of studies published in 2020, scientists from the Behavioural Neuroscience lab demonstrated how animals acquire this ability and identify the neural circuitry crucial for implementing it.

18
CISS ▼
Nuno Couto (Systems Oncology lab)

Simons-Emory International Consortium on Motor Control ◗

Machine Learning Course for High School Students ✖
The Science Education Project LaMAA ran this course over six separate days in May and June using the online platform Discord

21
Life & Future @CCU ★
First meeting of a new volunteer-ran initiative for optimising regulations concerning CR Work Culture

22
Behzad et al. ♦
Relationship between odor intensity estimates and COVID-19 prevalence prediction in a swedish population. Chemical Senses. (Systems Neuroscience lab)

25
CISS ▼
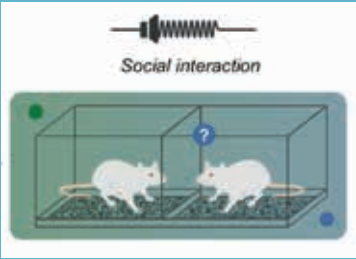Patrícia Francisco (Behaviour & Metabolism lab)

Megan Carey and Rui Costa Join Simons-Emory International Consortium on Motor Control

The Simons Foundation awarded scientists from Emory University and their collaborators $2.5 million to form the Simons-Emory International Consortium on Motor Control.

CR's Neural Circuits & Behaviour lab, headed by Megan Carey, and Neurobiology of Action lab, headed by Rui Costa, are two of the eight research groups selected to participate in this consortium.

Within the scope of this project, labs will use cutting-edge techniques and develop new tools to study how the brain controls behaviour in vertebrates.

Simons-Emory International Consortium on Motor Control

CR Open Colloquia

The CR Colloquia series has always been open to external participants, but since all events have become virtual, special adjustments had to be made to maintain this approach. In the end of May, we have expanded our webinar capacity to allow open online seminars, following with 14 Open Colloquia until the end of the year.

28
Boehringer Ingelheim Fonds Fellowship ⬧

Catarina Costa
(Cell Fitness lab)

29
H2020-SOCIETAL CHALLENGES – Health, Demographic Change & Well-Being Grant ⬧

Funding ⬤

Nickolas Papanikolaou, Head of the Computational Clinical Imaging Group, Receives Procancer-I Grant

Coordinated by Idryma Technologias Kai Erevnas in Greece, the consortium gathers 19 participants, from 11 different countries in the project "An AI platform integrating imaging data and models, supporting precision care through prostate cancer's continuum". This international team will develop advanced artificial intelligence models to address unmet clinical needs in prostate cancer.

26
Neuroscience Course for High School Students �ខ

The Science Education Project LaMAA ran this course over six separate days in May and June using the online platform Discord

CCU COVID-19 Test Lab Assists Instituto da Segurança Social ☀

In this two-months long project, SARS-CoV-2 PCR tests were administered to staff of social entities under a protocol with Instituto da Segurança Social

27
Tsiknakis et al. ⬧

Interpretable artificial intelligence framework for COVID-19 screening on chest X-rays. Experimental and Therapeutic Medicine. (Computational Clinical Imaging Group)

28
The CR Open Colloquia Series Begins ▼

ProCAncer-I

01
International Children's Day ✖

In this animated video, six Champalimaud kids shared their thoughts about various topics, including the work of their parents!

02
Mendonça et al. ♦

The impact of learning on perceptual decisions and its implication for speed-accuracy tradeoffs. Nature Communications. (Systems Neuroscience lab)

Dias et al. ♦

Extracellular vesicles enriched in hsa-miR-301a-3p and hsa-miR-1293 dynamics in clear cell renal cell carcinoma patients: potential biomarkers of metastatic disease. Cancers (Basel). (Systems Oncology lab)

08
CISS ▼

Vanda Póvoa (Cancer Development & Innate Immune Evasion lab)

Agrati et al. ♦

Expansion of myeloid-derived suppressor cells in patients with severe coronavirus disease (COVID-19). Cell Death & Differentiation. (Immunotherapy / ImmunoSurgery lab)

09
Oliveira et al. ♦

Platinum-triggered bond-cleavage of Pentynoyl Amide and N-Propargyl handles for drug-activation. Journal of the American Chemical Society. (Cancer Development & Innate Immune Evasion lab)

10
Rebelo de Almeida et al. ♦

Zebrafish xenografts as a fast screening platform for bevacizumab cancer therapy. Communications Biology. (Cancer Development & Innate Immune Evasion lab)

10
Messina et al. ♦

COVID-19: viral-host interactome analyzed by network based-approach model to study pathogenesis of SARS-CoV-2 infection. Journal of Translational Medicine. (Immunotherapy / ImmunoSurgery lab)

17
CR Retreat Celebration ★

Publications ♦

Zebrafish Offer a Fast Screening Platform for Cancer Drug That Targets Blood-Vessel Growth

Since tumours often induce the growth of blood vessels as a means of receiving nutrients, it was thought that drugs that suppress this process may be an effective cancer treatment. However, despite promising preclinical results, average response rates to such therapies are reduced for most cancers, while incurring in remarkable costs and side effects. In this study, the Cancer Development & Innate Immune Evasion lab presents a quick, four day personalised medicine assay, where zebrafish avatars help determine whether a patient would benefit from this therapy or not.

Culture ★

CR Annual Retreat

Each year, the members of the CR Community pack their bags and travel to a lovely location for a four-day community-building experience with non-stop scientific and social events. Even though this year the physical retreat was cancelled, the Communications, Events & Outreach Team created a three-day campaign celebrating this cherished event.

18
TEDx
Presentation ✖
by Hedi Young (Cortical
Circuits lab)

22
CISS ▼
Gabriela Ribeiro
(Neuropsychiatry Unit)

Brain-Body
Interactions
Seminar Series
Begins ▼
The first speaker of the
series was Stephen Liberles
(Harvard Medical School).
Vagal sensory neurons that
guard the airways

Horizon 2020
– Future and
Emerging
Technologies
Grant ◗

25
Colloquium ▼
Gérard Eberl (Institut Pasteur).
Early life imprinting of
immune reactivity

Outreach ✖

You Didn't Choose
to Watch This Talk

As we discover more about how the brain works,
questions that used to be a purely philosophical matter
– such as the existence of free will – begin falling into
the realm of neuroscience.

Will you join the tens of thousands of people who have
already watched this intriguing talk by Hedi Young, a PhD
student at the Cortical Circuits lab? Perhaps the answer
is not up to you.

Events ▼

New Virtual Seminar
Series: Brain-Body
Interactions (BBIS)

Created by Carlos Ribeiro (Behaviour & Metabolism
lab) and Asya Rolls (Technion, Israel), this 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 ran and moderated by
a worldwide network of students and
postdocs working in the US (Harvard),
Portugal (CCU), and Israel (Technion).

Funding ◗

The Collective Behaviour
Lab Receives AI Research
Consortium Grant (ALMA)

The aim of this project is to leverage Algebraic Machine
Learning properties to develop a new generation of interactive,
human-centric machine learning systems. These systems
are expected to reduce bias and prevent discrimination,
remember what they know when they are taught something
new, facilitate trust and reliability and integrate complex
ethical constraints into human–artificial intelligence systems.
Furthermore, they are expected to promote distributed,
collaborative learning.

25
PhD Defence ▼
Rita Félix (Vision to Action
and Neural Circuits &
Behaviour labs).
Sensory and motor
representations in the inferior
olive of larval zebrafish

Costa et al. ◆
Automated discovery
of local rules for desired
collective-level behavior
through reinforcement
learning. Frontiers in
Physics. (Collective
Behaviour lab)

Global
Consortium for
Reproductive
Longevity and
Equality Grant ◗

26
Two FCT
Individual
Scientific
Employment
Funding ◗
Raquel Lemos
(Neuropsychiatry Unit),
Roksana Pirzgalska
(Immunophysiology lab)

29
BBIS ▼
Michal Schwartz (Weizmann
Institute of Science).
Novel immunotherapy to
treat Alzheimer's Disease
and Dementia: from
curiosity-driven research
to prospect of therapy

Dias et al. ◆
Plasma extracellular vesicle-
derived TIMP-1 mRNA as
a prognostic biomarker
in Clear Cell Renal Cell
Carcinoma: A pilot study.
International Journal
of Molecular Sciences.
(Systems Oncology lab)

Funding ◗

Behaviour & Metabolism
Lab Investigators Receive
Grant to Study the Relation
Between Diet and Fertility

Carlos Ribeiro and Zita Santos are among the few non-
US scientists to receive the first grant from the Global
Consortium for Reproductive Longevity and Equality
(GCRLE), a joint initiative of the Buck Institute for
Research on Aging (USA) and the Bia-Echo Foundation.

The hypothesis driving this project is based on
innovative findings made in the lab and published in
August (Carvalho-Santos et al.). Their results reveal
that changes in the nutritional requirements of sex cells
make female flies crave sugar. In the GCRLE project, the
team is planning to investigate this newly-discovered
phenomenon more deeply as well as analyse whether
dietary treatments can help reduce or even reverse
fertility decline in aging fruit flies.

GLOBAL CONSORTIUM
FOR REPRODUCTIVE
LONGEVITY & EQUALITY

02
Colloquium ▼
David Schoppik (NYU Grossman School of Medicine). How the brain comes to balance: Development of postural stability and its neural architecture in larval zebrafish

Varanda et al. ◆
Zebrafish xenografts unveil sensitivity to Olaparib beyond BRCA status. Cancers (Basel). (Cancer Development & Innate Immune Evasion lab)
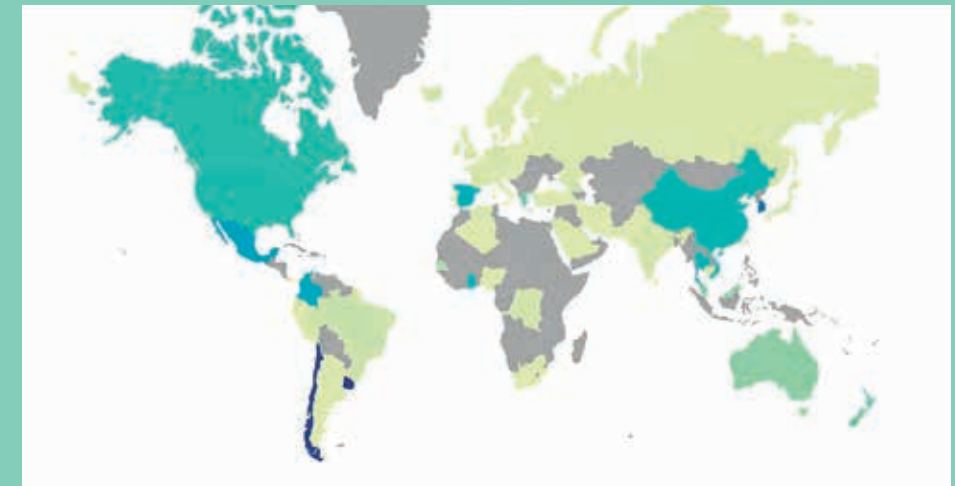
SmellTracker Study Communicated to Portuguese Media ☀

06
FCT Grant RESEARCH 4COVID-19 ⬦
Diana Frasquilho Guerreiro (Neuropsychiatry Unit)

07
Maratona da Saúde Award ⬦

08
Song et al. ◆
Immunological and inflammatory profiles in mild and severe cases of COVID-19. Nature Communications. (Immunotherapy/ImmunoSurgery lab)

COVID ☀

Online Smell-Test Can Help You Detect COVID-19 Cases and Map Their Spread

The high infection rate of the SARS-CoV-2 virus means that finding a quick and easy way to detect COVID-19 cases is critical for personal and public health. However, widespread physiological COVID-19 testing is challenging to implement.

This is where SmellTracker comes in. This simple test relies on the fact that loss of sense of smell is one of the main symptoms of COVID-19. It offers an easy way for individuals to assess their olfaction at home while gathering vital information about patterns of COVID-19 symptoms across the population.

Originally developed in the lab of Israeli scientist Noam Sobel, SmellTracker is an international study that involves multiple collaborators, including CR's Systems Neuroscience lab. So far, more than 10,000 individuals from 134 countries participated in the study, which has been providing promising preliminary results.

Funding ⬦

Adriana Sanchéz-Danés Receives Maratona da Saúde Award

Sanchéz-Danés (Cancer & Stem Cell Biology lab) is one of two researchers selected for the 7th edition of the Maratona da Saúde Investigation Award, which was organised in partnership with the Fundação para a Ciência e a Tecnologia (FCT). The goal of her project is to decipher the mechanisms leading to therapy resistance in medulloblastoma, one of the most common pediatric brain tumours.

MARATONA da Saúde

How Do Individual Genetic Differences Influence Mortality from COVID-19?

MHC is a group of genes that code for proteins that help the immune system recognise foreign invaders. Taking the data deposited in the GISAID database, the Immunotherapy / ImmunoSurgery lab made predictions to gauge how variants in the SARS-CoV-2 genome may affect peptide binding to the most frequent MHC types in Africa, Asia and Europe. Their results indicate that MHC typing along with viral sequence analysis should be considered in studies examining clinical outcomes in patients with COVID-19.

This research article was published as part of the "BEAT-CANCER-AND-INFECTIONS" Alliance.

Brem et al. ◆
Corticomotor Plasticity Predicts Clinical Efficacy of Combined Neuromodulation and Cognitive Training in Alzheimer's Disease. Frontiers in Aging Neuroscience. (Neuropsychiatry Unit)

09
Colloquium ▼
Christiane Linster (Cornell University). Cholinergic regulation of learning in the olfactory system

16
Colloquium ▼
Kumi O. Kuroda (RIKEN Center for Brain Science). Neural circuit for fatherhood and motherhood in the medial preoptic area

18
de Sousa et al. ◆
Mortality in COVID-19 disease patients: Correlating the association of major histocompatibility complex (MHC) with severe acute respiratory syndrome 2 (SARS-CoV-2) variants. International Journal of Infectious Diseases. (Immunotherapy/ImmunoSurgery lab)

20

BBIS ▼

Monica Dus (University of Michigan). Epigenetic reprogramming of taste by diet

22

Four "la Caixa" Junior Leadership Fellowships ◊

23

Colloquium ▼

Ansgar Büschges (University of Cologne). The complexity of the ordinary – neural control of locomotion

28

Machado et al. ♦

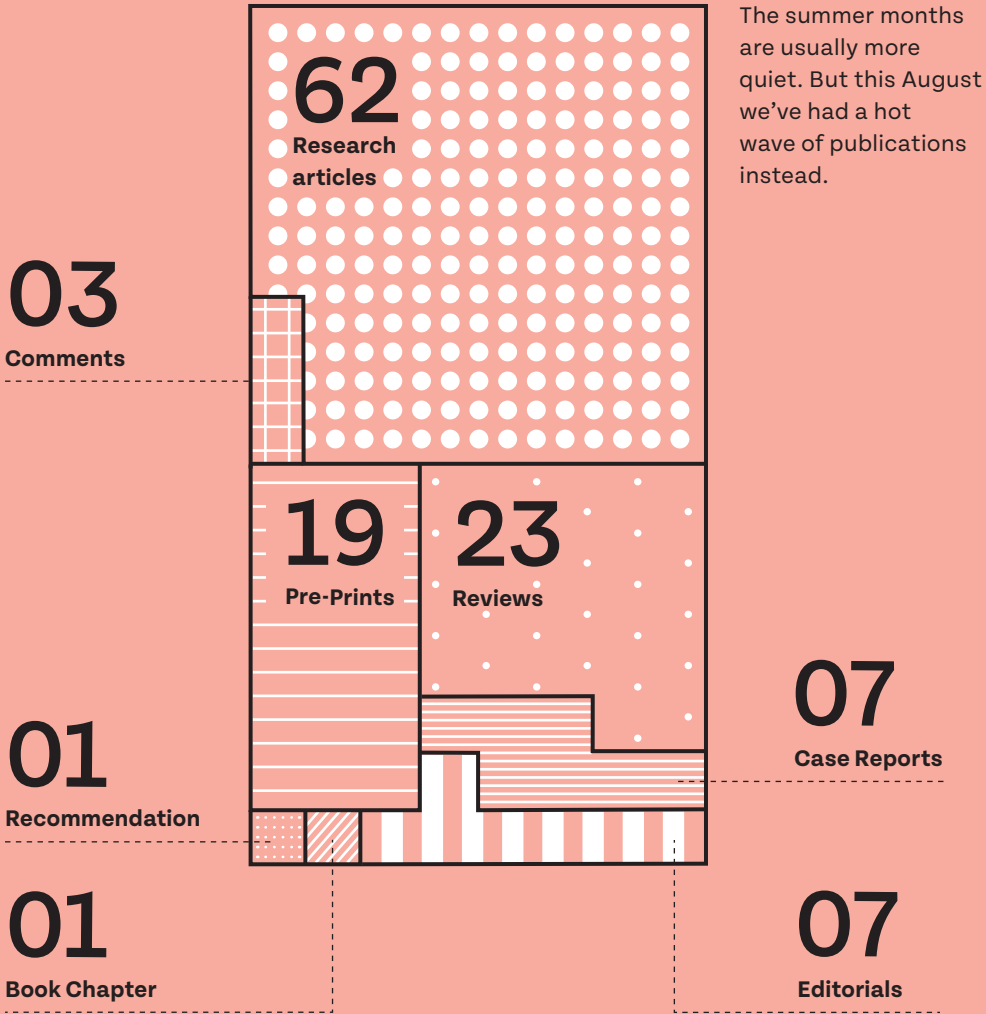Shared and specific signatures of locomotor ataxia in mutant mice. elife. (Neural Circuits & Behaviour lab)

1

Fernandez et al. ♦

Salvage surgery with organ preservation for patients with local regrowth after watch and wait: Is it still possible? Diseases of the Colon & Rectum. (Molecular & Experimental Pathology lab)

12

Zhang et al. ♦

Single-cell landscape of immunological responses in patients with COVID-19. Nature Immunology. (Immunotherapy / ImmunoSurgery lab)

Funding ◖

"La Caixa" Foundation Junior Leadership Fellowships Awarded to Four CR Investigators

Andrada Ianus (Preclinical MRI lab) aims to develop an MRI method for detecting the early neural signatures of Alzheimer's Disease (AD).

Adrien Jouary (Vision to Action lab) will work on understanding how neurons coordinate their activity to control fine sequences of movements and to break-through our understanding of the brain activity.

Roel Wolterink (Immunophysiology lab) will attempt to decipher the architecture and language of pulmonary neuroimmune communication by developing and implementing broad-range systems to measure and characterise neuroimmune interactions.

Esha Madan (Cell Fitness lab) aims to identify molecular pathways involved in the formation and growth of breast cancer.

"la Caixa" Foundation

2020 Scientific Publications

62 Research articles

03 Comments

19 Pre-Prints

23 Reviews

01 Recommendation

01 Book Chapter

07 Case Reports

07 Editorials

The summer months are usually more quiet. But this August we've had a hot wave of publications instead.

13
Hoshino et al. ♦
Extracellular vesicle and particle biomarkers define multiple human cancers. Cell. (Systems Oncology lab)

Mezzera et al. ♦
Ovipositor extrusion promotes the transition from courtship to copulation and signals female acceptance in Drosophila melanogaster. Current Biology. (Innate Behaviour Group)

18
Coelho & Moreno ♦
Neuronal selection based on relative fitness comparison detects and eliminates Amyloid-β-induced hyperactive neurons in Drosophila. iScience. (Cell Fitness lab)

Publications ♦

Sex, Flies and Videotape

For many years, fruit fly investigators have been engaged in a passionate debate over the role of an organ called the ovipositor in courtship. Various reports implicated the sudden emergence of this organ in both sexual rejection and acceptance. Now, researchers at the Innate Behaviour lab, discovered that the ovipositor plays a crucial role in the transition from courtship to copulation.
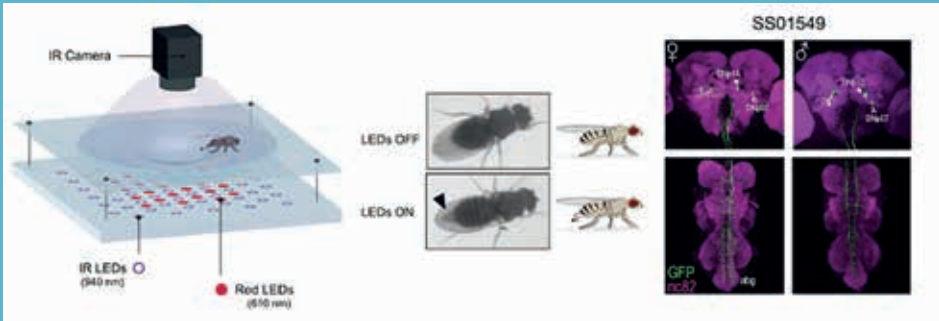
The schematic on the left shows the setup used in this study. It relies on a method called optogenetics in which scientists selectively modify neurons so that they can switch their activity on and off using light. With this approach, the scientists identified neurons that control the extrusion of the ovipositor.

Publications ♦

Scientists Discover a Social Safety Cue

Freezing is one of the three universal defence responses, together with fight and flight. This response is the best course of action in situations where escape is either impossible or less advantageous than just staying still with the hope of remaining unnoticed. The Behavioural Neuroscience lab has recently demonstrated that individual fruit flies freeze in response to an inescapable threat. This finding triggered their curiosity, would this behaviour change if there were other flies around? The answer to this question led to the discovery of a social safety cue – movement. This finding, published in the scientific journal Nature Communications, marks a new phase in our understanding of how social communication works.
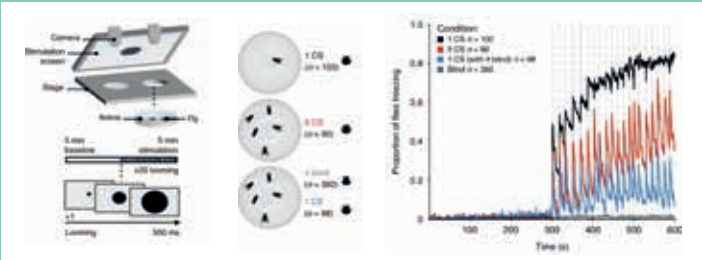
In one of the experiments, the scientists used blind flies, which do not perceive the looming shadow and therefore do not freeze. When a normal fly was in the presence of these blind flies, it froze significantly less (blue trace) compared with solitary flies (black trace) or those who were grouped with normal flies (red trace). Groups made of only blind flies didn't freeze at all (grey trace).

Publications ♦

New Connectivity Map Highlights Brain Circuits Associated with Mania

For most lay people, mania is a manifestation of bipolar disorder, a psychiatric illness that is typically not associated with brain lesions. However, mania can also appear following a brain injury in people with no previous history of bipolar disorder. Identifying the brain circuits affected in these "lesional" cases of mania, in addition to contributing to understanding the underlying mechanisms, could help find more effective treatments for bipolar disorder. A study by the Neuropsychiatry Unit provides significant progress in the matter.
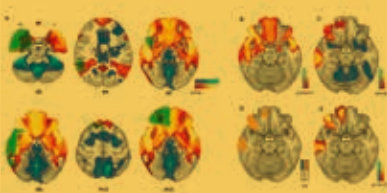

While lesions associated with mania can occur in multiple brain regions, they converge to specific brain circuits, resulting in a brain-wide connectivity map. In this map, regions associated with mania are shown in warm colours, whereas regions that are not are shown in cool colours. Six examples of specific lesions associated with mania are highlighted in green.

21
Ferreira & Moita ♦
Behavioral and neuronal underpinnings of safety in numbers in fruit flies. Nature Communications. (Behavioural Neuroscience lab)

24
Cotovio et al. ♦
Mapping mania symptoms based on focal brain damage. Journal of Clinical Investigation. (Neuropsychiatry Unit)

Stronger Together in the Microbiome

In this study, the Behaviour & Metabolism lab shared important insight into the intriguing topic of microbiome-host relationship. The team used an array of high-tech tools in the fruit fly model organism to reveal that gut microbes feed each other to overcome dietary deficiencies, change host behaviour and improve reproduction.
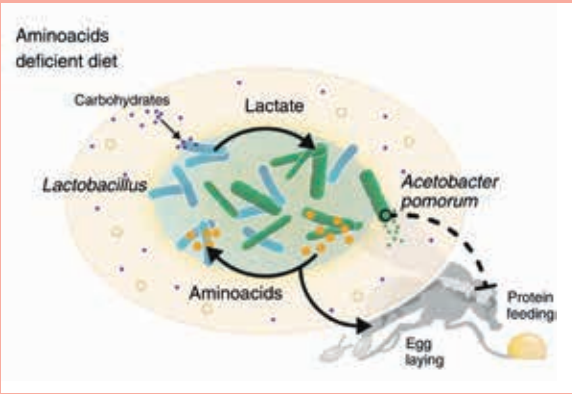
Schematic describing the metabolic interactions between two types of gut microbes and their potential effects on the bacterial community and the host.

25
Henriques et al. ♦

Metabolic cross-feeding in imbalanced diets allows gut microbes to improve reproduction and alter host behaviour. Nature Communications. (Behaviour & Metabolism lab)

27
Meng et al. ♦

Human umbilical cord-derived mesenchymal stem cell therapy in patients with COVID-19: a phase 1 clinical trial. Signal Transduction and Targeted Therapy. (Immunotherapy / ImmunoSurgery lab)

31
Carvalho-Santos et al. ♦

Cellular metabolic reprogramming controls sugar appetite in Drosophila. Nature Metabolism. (Behaviour & Metabolism lab)

The Academic Year Begins

CR has always dedicated considerable efforts to the development and implementation of outstanding educational programmes, advanced courses, and workshops. Among these, two main endeavours are the International Neuroscience & Physiology Doctoral Programme (INPDP) and the CAJAL Advanced Neuroscience Training Programme.

In 2020, due to the pandemic and to the fact that CR shares common spaces with clinical facilities at the CCU, the CAJAL Advanced Courses were canceled. Similarly, the traditional recruitment of a 2020 INPDP class was suspended. Instead, a small number of students, who will integrate the doctoral programme in the 2021 Edition, were directly recruited to specific labs.

International Neuroscience & Physiology Doctoral Programme (INPDP)

Director
Joe Paton

Education Committee
Adriana Sánchez-Danés
Christa Rhiner
Eugenia Chiappe
Marta Moita
Susana Lima

Coordinator
Thiago Carvalho

Programme Managers
Maria Teresa Dias
Simone Zacarias (until September 2020)

Programme Assistant Manager
Jorge Henriques (from October 2020)

Graduate Programme 2020 Scientific Advisory Board
Alessandro Treves, Neuroscience coordinator, International School for Advanced Studies, Trieste; Gilles Laurent, Director Max Planck Institute for Brain Research, Frankfurt; Darcy Kelley, co-Director of the Doctoral Program in Neurobiology and Behavior, Columbia University; Maria Leptin, Director of EMBO, the European Molecular Biology Organization

Students Recruited in 2020
Ana Sofia Marques (Cancer & Stem Cell Biology lab)
Dean Rance (Collective Behaviour lab)
Margarida Caio (Stem Cells & Regeneration lab)
Naz Belkaya (Circuit Dynamics & Computation lab)
Rory Beresford (Behaviour & Metabolism lab)

03
Groneberg et al. ♦
Early-life social experience shapes social avoidance reactions in larval zebrafish. Current Biology. (Collective Behaviour and Vision to Action labs)

Chan Zuckerberg Initiative Grant ⬭

07
BBIS ▼
Stephen Simpson (University of Sydney). Towards resolving the Protein Paradox in longevity and late-life health

11
Trivizakis et al. ♦
Advancing COVID-19 differentiation with a robust preprocessing and integration of multi-institutional open-repository computer tomography datasets for deep learning analysis. Experimental and Therapeutic Medicine. (Computational Clinical Imaging Group)

14
CISS ▼
Catarina Costa (Cell Fitness lab), Severin Berger (Theoretical Neuroscience lab)

BBIS ▼
Irene Miguel-Aliaga (Imperial College London). Sex, guts and babies: the plasticity of the adult intestine and its neurons

15
PhD Defence ▼
Pietro Vertechi (Systems Neuroscience lab). Latent variable decoding in biological and artificial agents: towards a unified approach

---

Funding ⬤

Henrique Veiga-Fernandes Awarded Chan Zuckerberg Initiative Grant

The project, selected for the Single-Cell Analysis of Inflammation grant, comprises a team of three prominent scientists who will join forces to unravel neuro-immune interactions and their potential therapeutic contributions to pulmonary infection and inflammation. The team plans to attack this complex problem by combining their unique expertise in the fields of immunology and neuroscience.

CZ CHAN ZUCKERBERG INITIATIVE

17
Colloquium ▼
David McCormick (University of Oregon). Rapid state changes account for apparent brain and behavior variability

18
Fundamentals of Medicine Course ▼
Q&A Session

19
Soapbox Science Lisbon ✖
Adriana Sánchez-Danés (Cancer & Stem Cell Biology lab), Edite Figueiras (Vision to Action lab), Oihane Horno (Theoretical Neuroscience lab). A ciência é para ti.

21
CISS ▼
Rui Simões (Preclinical MRI lab), Gabriela Fioreze and Marina Fridman (Cortical Circuits lab)

PhD Defence ▼
Pedro Rodrigues (Neuropsychiatry Unit). Knowledge versus experience – Exploring model-based and model-free reinforcement learning in obsessive-compulsive disorder

BBIS ▼
Isaac Chiu (Harvard Medical School). Neuro-immune interactions in pain and host defense

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Events ▼

Fundamentals of Medicine for Scientists

Based on University of Algarve's ground-breaking medical programme, which employs a problem-based learning approach, the "Fundamentals of Medicine Course" provides a selected group of CR scientists with a strong foundation on the principles of human physiology, pathology and medicine.

The course is part of a continuous endeavour of the Champalimaud Foundation to promote proximity between medical doctors and fundamental researchers as a means to facilitate synergistic interactions across fields.

QuantOCancer Presents:
Your Data, Your Story –
Showcase and Share It Right!

Events ▼

QuantOCancer is an EU-funded project that aims to increase research capacity and network building within and beyond CR, provide training opportunities for researchers and support staff, engage a responsible research and innovation culture and develop institutional strategies towards an equitable working environment.

This new series was one of the initiatives the project organised in 2020.

quanto cancer

05
BBIS ▼
Jonathan Kipnis (Washington University). Meningeal lymphatics and peripheral immunity in brain function and dysfunction

07
Botta et al. ♦
An amygdala circuit mediates experience-dependent momentary arrests during exploration. Cell. (Neurobiology of Action lab)

08
Colloquium ▼
Benjamin de Bivort (Harvard University). Functional and structural loci of individuality in the Drosophila olfactory circuit

Life @CCU ★
CCU-Wide Newsletter Launched

12
CISS ▼
Adriana Sánchez-Dánes (Stem Cell & Cancer Biology lab), Ana Capacho (Radiopharmacology lab)

BBIS ▼
Brad Dickerson (University of North Carolina). An evolutionarily conserved hindwing circuit mediates Drosophila flight control

22
New Seminar Series Takes Off: Your Data, Your Story – Showcase and Share It Right! ▼
The first session featured a talk by Paola Masuzzo (IGDORE). Open and Inclusive Science outside of the academic bubble

23
Video ✖
Markus Maeurer (Immunotherapy/Immunosurgery) prepared a video for the exhibit "Viral" at Lisbon's Science Museum – Pavilhão do Conhecimento

24
Colloquium ▼
Catherine Dulac (Harvard University). Neurobiology of social behavior

25
Mondi et al. ♦
COVID-19 in people living with HIV: Clinical implications of dynamics of the immune response to SARS-CoV-2. Journal of Medical Virology. (Immunotherapy/ImmunoSurgery lab)

28
CISS ▼
Roksana Pirzgalska (Immunophysiology lab), Francisco Heras (Collective Behaviour lab)

BBIS ▼
Stefanie Schirmeier (University of Munster). Glia neuron metabolic interactions in Drosophila

30
Câmara Municipal de Lisboa – BIP/ZIP Programme ◗
Catarina Ramos and André Mendonça (CEO team) with TreeTree2. O LaMAA vai à Escola

13
CONGENTalks Begins ▼

The first seminar in the series was by Pedro Faísca (Instituto Gulbenkian de Ciência). Application of stereology in quantitative pathology: Stereological assessment of the murine intestinal tract

15
Colloquium ▼

Daniel Wolpert (Columbia University). Contextual inference underlies the learning of sensorimotor repertoires

18
Fundamentals of Medicine Course Begins ▼

19
CISS ▼

Raquel Lemos (Neuropsychiatry Unit) and Ana Gonçalves (Neural Circuits & Behaviour lab)

BBIS ▼

Daniel Mucida (The Rockefeller University). Neuro-immune interactions in the gut

PhD Advanced Course: Stem Cell Technologies ▼

Organisers: Susana Solá (Faculty of Pharmacy, University of Lisbon) and Christa Rhiner (Stem Cells & Regeneration lab, CR)

CONGENTalks

Events ▼

This seminar series features open monthly talks coordinated by CONGENTO – the Consortium for Genetically Tractable Organisms. CONGENTO is a Portuguese initiative that aims to establish an infrastructure for technological developments in Drosophila, zebrafish and mouse, and provide state-of-the art services in all three organisms.

In this new seminar series, the CONGENTO working-groups address different topics by hosting external speakers, as well as showcasing innovative services provided by the infrastructure.

congento

Rethinking the Link between Cannabinoids and Learning

Many people are only aware of the recreational aspect of cannabinoids. But in fact these molecules naturally exist in our brains where they participate in various processes, such as learning and memory. For instance, mice that naturally lack cannabinoid receptors in their brains exhibit overall reduced activity levels, as well as deficits in learning and memory.

In this study, the Neural Circuits & Behaviour lab investigated the mechanism by which cannabinoids exact their effect on learning in these mice. To their surprise, they found that the lack of cannabinoid signalling didn't directly alter the mice's learning ability. Instead, it has affected their behavioral state, making them overall less active, and therefore less able to learn.

Remarkably, when these animals were placed on a motorised treadmill while being trained on the same learning task, their performance was completely restored.
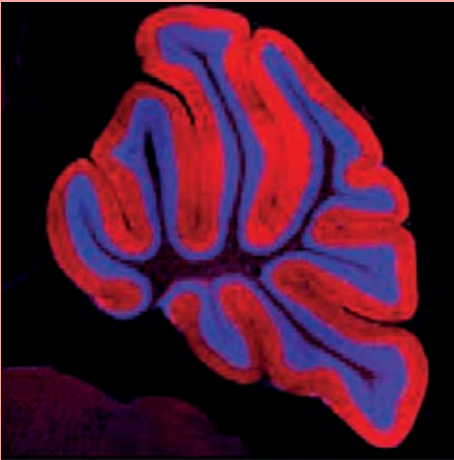
Cross section of a mouse brain shows a brain area called the cerebellum. The location of cannabinoid receptors in the cerebellum is revealed in red.

20
Albergaria et al. ◆

Cannabinoids modulate associative cerebellar learning via alterations in behavioral state. eLife. (Neural Circuits & Behaviour lab)

22
Colloquium ▼

Lisa Giocomo (Stanford University). Multiple maps for navigation

23
Pestana et al. ◆

Statistical methods for the study of extracellular vesicles content and their potential as biomarkers of multiple myeloma aggressiveness. Journal of Statistics on Health Decision. (Myeloma Lymphoma Research Group)

Tobaly et al. ◆

CT-Based Radiomics Analysis to Predict Malignancy in Patients with Intraductal Papillary Mucinous Neoplasm (IPMN) of the Pancreas. Cancers (Basel). (Computational Clinical Imaging Group)

"la Caixa" INPhINIT Fellowship ◆

Miguel Pinto (Cell Fitness lab)

Albino Oliveira-Maia Receives a Starting Grant by the European Research Council

Albino Oliveira-Maia (Neuropsychiatry Unit) was awarded 1.5€ Million to continue his ground-breaking exploration of the communication between the digestive and nervous systems. He is the first practicing physician in Portugal to be recognised by this prestigious award.

Oliveira-Maia and his team have recently identified a digestive-brain axis that controls food choice in mice (Fernandes et al.). In this new project, called CalorieRL, the team will be building on these findings to investigate food choice in humans. It is hoped that the project will shed some light on how and why we choose the foods that we eat, which may go some way in the ongoing battle against obesity.

erc
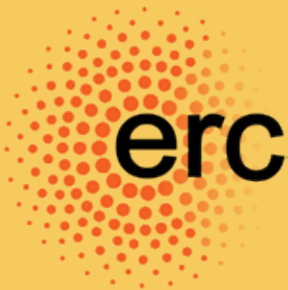
26
BBIS ▼
Michael O'Donnell (Yale University). Modulation of C. elegans behavior by gut microbes

27
Sacchi et al. ♦
Early expansion of myeloid-derived suppressor cells inhibits SARS-CoV-2 specific T-cell response and may predict fatal COVID-19 outcome. Cell Death & Disease. (Immunotherapy / ImmunoSurgery lab)

European Research Council Starting Grant ●

28
Esteban Masferrer et al. ♦
Differential encoding of predator fear in the ventromedial hypothalamus and periaqueductal grey. The Journal of Neuroscience. (Neuroethology lab)

Workshop ✖
LaMAA at Agrupamento de Escolas de Figueira de Castelo Rodrigo

29
Workshop ▼
Obesity at the Interface of Neuroscience and Physiology II

30
Constantino et al. ♦
Are lesion features reproducible between 18F-FDG PET/CT images when acquired on analog or digital PET/CT scanners? European Radiology. (Radiopharmacology lab)

Maia et al. ♦
Employing flow cytometry to extracellular vesicles sample microvolume analysis and quality control. Frontiers in Cell and Developmental Biology. (Systems Oncology lab)

Obesity at the Interface of Neuroscience and Physiology II
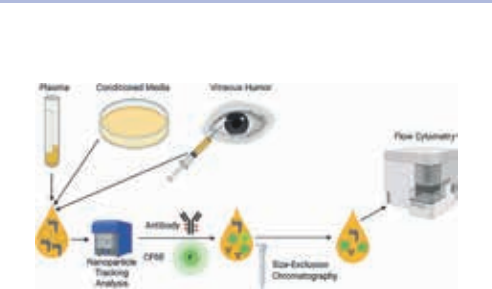
One of the first very visible effects of the COVID-19 pandemic at the CCU was the cancellation of the "Obesity at the Interface of Neuroscience and Physiology" event, which was initially planned for the beginning of march.

This event, funded by the "European Society for the Study of Obesity/Novo Nordisk fellowship for activities related with the World Obesity Day 2020", was organised by Gabriela Ribeiro (Neuropsychiatry Unit) and Roksana Pirzgalska (Immunophysiology lab). Six months later, the pair effectively put the event back on its feet using a modified online format that attracted great participation.

New Method Offers a More Efficient Way to Study What Extracellular Vesicles Can Tell Us about an Individual's Health

Extracellular vesicles – tiny spheres secreted by cells – have attracted attention as a non-invasive source of clinical biomarkers in liquid biopsies. This, however, has proved to be a technically challenging operation. In this study, the Systems Oncology lab presents a new method that not only solves many outstanding obstacles, but also accelerates the analysis, and multiplies the number of different extracellular vesicles analytes that can be studied from a single collection of biofluid.
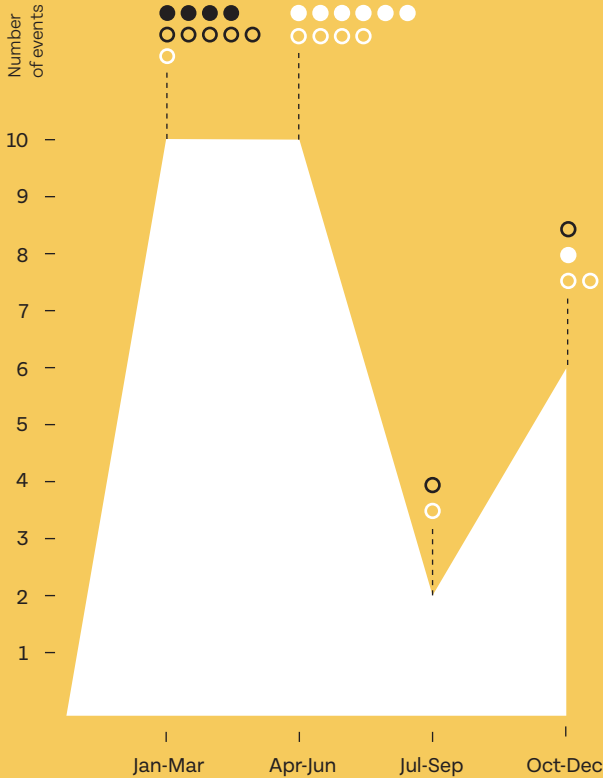
CISS ▼
Bruna Ferreira (Myeloma
Lymphoma Research Group),
Adrien Jouary (Vision to
Action and Theoretical
Neuroscience labs)

BBIS ▼
Yoav Livneh (Weizmann
Institute of Science).
Cortical estimation of
current and future bodily
states

**Begin Weekly
Serological
Screening
for COVID-19
of CR members** ☀

A Brief Look
at Outreach

Just as scientific events
bounced back after an
adaptation period, so did
educational and outreach
events, which have found
ways to cross into the
virtual medium.

In parallel to the activities
represented here, the CR
community engaged in a
series of COVID-19-related
public engagement events
listed in the timeline
section of the report.

Number
of events

10 –

9 –

8 –

7 –

6 –

5 –

4 –

3 –

2 –

1 –

● On-site at the CCU
○ On-site outside the CCU
○ Online hosted by the CCU
○ Online hosted outside the CCU

Jan-Mar   Apr-Jun   Jul-Sep   Oct-Dec

Thank you!

Volunteers
Adriana Martins, Adriana
Sánchez-Danés, Albino
Oliveira-Maia, Alexandre
Azinheira, Alexandre Laborde,
Alice Martins, Ana Assis, Ana
Cruz, Ana Gerschenfeld, Ana
Gonçalves, Ana Stillwell, André
Marques, André Mendonça, André
Monteiro, Anh Nguyen, Antonia
Groneberg, Beatriz Belbut, Bruno
Rito, Bárbara Pinto, Caio Mainen,
Catarina Almeida, Catarina Figueiredo,
Catarina Mendes, Catarina Pimentel,
Catarina Ramos, Christa Rhiner, Cristina
Afonso, Cristina Chavarrías, Cristina Ferreira,
Cristina Godinho da Silva, Danbee Kim, Daniel
Münch, Daniela Pereira, Dario Sarra, Dasha
Smith, Dennis Goldschmidt, Diogo Guerra,
Diogo Matias, Edite Figueiras, Liad Hollender,
Eduardo Moreno, Elena Hindinger, Eleni Smaragdi,
Eliane Arez Carvalho, Emília Rito, Filipe Rodrigues,
Gautam Agarwal, Gonzalo de Polavieja, Gonçalo
Guiomar, Gonçalo Lopes, Hanne Stensola, Hedi
Young, Hugo Marques, Joana Carvalho, Jovin Jacobs,
João Afonso, João Cruz, João Frazão, João Ramos, Juan
Castiñeiras, Laura Ward, Leonor Morgado, Liliana Costa,
Louise Lindblad, Lucas Martins, Luís Oliveira-Maia, Madalena
Calaim, Margarida Anjos, Margarida Garcia, Margarida Pinto,
Maria João Lourenço, Mariana Sampaio, Marko Šestan, Markus
Maeurer, Nicolas Morgerstern, Nuno Calaim, Nuno Loureiro,
Nuno Rito, Oihane Horno, Paco Romero, Pedro Alves, Pedro
Gouveia, Pedro Silva, Radhika Rajan, Renata Cruz, Rita Baptista,
Rita Figueiredo, Rita Fior, Rita Saraiva, Ruth Diez del Corral, Ruxanda
Lungu, Sander Keemink, Sara Abalde, Sebastian Malagon, Simone
Zacarias, Sofia Freitas, Sofia Gouveia, Sofia Marques, Susana Lima,
Tatiana Silva, Tefy Sancho,

Teresa
Carona,
Teresa
Fernandes,
Teru
Fujiwara, Tiago
Almeida, Tiago
Coelho, Tiago
Quendera, Tita
Pardal, Tor Stensola,
Zach Mainen, Zita
Santos

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Caldeira, Chão Rico Hortícolas Bio, Ciência Viva/ ESERO Portugal, Coopérnico, Esc. Sec. D. Inês de Castro
(Alcobaça), Esc. Sec. D. Sancho II de Elvas (Elvas), Esc. Sec. de Palmela (Palmela), Esc. Sec. de Santa Maria
Maior (Viana do Castelo), Esc. Sec. Dr.ª Laura Ayres (Loulé), Esc. Sec. Padre António Vieira (Lisboa), Esc. Sec.
Quinta das Palmeiras (Covilhã), Esc. Sec. Rocha Peixoto (Póvoa do Varzim), Fundação Calouste Gulbenkian,
GoParity, Green Team @ CCU, ISCTE – Instituto Universitário de Lisboa, IST – Instituto Superior Técnico,
Plano Nacional de Leitura 2027, Salinas Greens, Série É Pr'a Amanhã, TreeTree2, Zero NGO, Zero Waste Lab

04

Akam et al. ♦

[The Anterior Cingulate Cortex Predicts Future States to Mediate Model-Based Action Selection.](#) Neuron. (Neurobiology of Action lab)

09

CISS ▼

Cátia Almeida (Cancer Development & Innate Immune Evasion lab), Eric DeWitt (Computational Cognitive Decision Science Group)

BBIS ▼

Pierre Leopold (Centre de recherche de l'Institut Curie). [Adjusting organ size during Drosophila development: how and why?](#)

Pinning Down How the Brain Predicts the Consequences of Choices

Learning to predict the outcomes of actions happens through two separate cognitive processes. Though distinct, it is frequently difficult to tell which scheme an individual is executing at any given instance. A study in mice by the Neurobiology of Action lab implements a novel experimental approach that untangles the two, and pins down how a specific brain structure represents the various features involved in the decision making process.
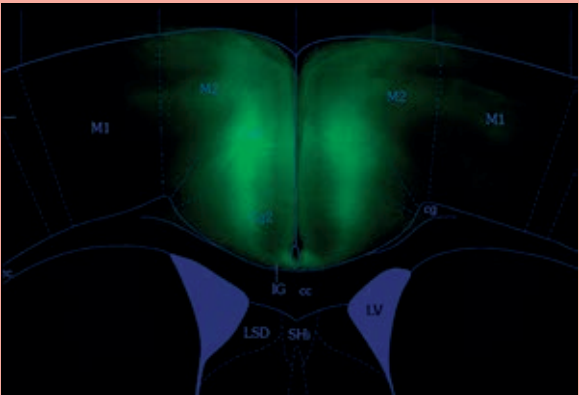
Brain cells switched off in the anterior cingulate cortex (green) prevent mice from learning flexibly

Henrique Veiga-Fernandes Receives 2020 Pfizer/SCML Award

Veiga-Fernandes was one of the winners of the "Fundamental Research Category", following his ground-breaking work on the interaction between the immune and nervous systems. In particular, the award highlighted a recent discovery by Veiga-Fernandes and his team, which was published last year in the scientific journal Nature. In this study, the researchers focused on the relation between the immune system and a brain area that controls the body's physiology across the day-night cycle, known as the "brain's clock".

prémios Pfizer

11

Pfizer/SCML Award ◐

16

CISS ▼

Eric de Sousa (Immunotherpay /ImmunoSurgery lab), Davide Reato (Circuit Dynamics & Computation lab)

Your Data, Your Story – Showcase and Share It Right! ▼

Bernd Pulverer (EMBO). [Transparent publishing and open science: How to share reproducible data](#)

18

University College London/ Wellcome Trust: Strategic Support – Science application. ◐

Zachary Mainen (Systems Neuroscience lab)

19

Colloquium ▼

Michael Brecht (Bernstein Center for Computational Neuroscience Berlin). [Blood is thicker than water](#)

20

Carvalho et al. ♦

[Is the proteome of bronchoalveolar lavage extracellular vesicles a marker of advanced lung cancer?](#) Cancers (Basel). (Systems Oncology lab)

Yon et al. ♦

[High-Resolution 3D in vivo brain diffusion tensor imaging at ultrahigh fields: following maturation on juvenile and adult mice.](#) Frontiers in Neuroscience. (Preclinical MRI lab)

Postdoctoral Researcher Roksana Pirzgalska Receives an ECCO Scholarship.

Funding ⬤

The scholarship will finance the research project "A neuroepithelial approach to inflammatory bowel disease" in which Pirzgalska will explore the intersection between the neuroepithelial and neuroimmune circuits in the intestine.

European Crohn's and Colitis Organisation

21
Webinar ✖

Susana Lima (Neuroethology lab). "Porque o sexo é tão importante?" (Festival COGITO)

23
CISS ▼

Joana Maia (Molecular & Experimental Pathology lab), Natalia Barrios (Behavioural Neuroscience lab).

BBIS ▼

Lisa Beutler (Northwestern University). Long-term effects of diet-induced obesity on gut-brain communication

24
CONGENTalks ▼

Vasco Barreto (CEDOC|NMS; CONGENTO). CRISPR@ CEDOC: Affordable genome editing of conventional cell lines, iPSCs, and primary cells

European Crohn's and Colitis Organization (ECCO) Scholarship ⬗

24
Launching the Science Collection ✖
"Inside the Unknown"

27
Maia et al. ♦

Transcriptome Reprogramming of CD11b+ Bone Marrow Cells by Pancreatic Cancer Extracellular Vesicles. Frontiers in Cell and Developmental Biology. (Systems Oncology lab)

Verde et al. ♦

Diffusion tensor-based fiber tracking of the male urethral sphincter complex in patients undergoing radical prostatectomy: a feasibility study. Insights Imaging. (Computational Clinical Imaging Group)

Game Presentation ✖

"Hexxed, a game to study human intelligence" (European Researcher's Night)

30
CISS ▼

Tomás Cruz (Sensorimotor Integration lab), Francisco Romero-Ferrero and Francisco Heras (Collective Behaviour lab)

BBIS ▼

Lisa Stowers (Scripps Research). Leveraging olfaction to understand how the brain and the body generate social behavior

Communicating Science with Animated Stories

Outreach ✖

Aspiring to move beyond the "one-sentence" headline and get into the nitty gritty of the scientific process, CCU's Communication, Outreach & Events Team has created an animated science collection called "Inside the Unknown".

The collection kicked off with a selection of four projects, presenting studies from the three departments of CR. Mirroring the scientific work within, this collection will continue to evolve and grow over time.

04
Horizon 2020 Leadership in Enabling and Industrial Technologies Project ⬦

head of the Collective Behaviour lab joins Horizon 2020 Leadership in Enabling and Industrial Technologies Project "FindingPheno"

LaMAA Goes Fully Virtual ✖

07
CISS ▼
Maria Martinez-López (Immunophysiology lab), Margarida Sousa (Learning lab)

BBIS ▼
Diego V. Bohorquez (Duke University). A gut choice

08
Podlaski & Machens ⬦
Biological credit assignment through dynamic inversion of feedforward networks. Advances in Neural Information Processing Systems 33. (Theoretical Neuroscience lab)

Gonzalo de Polavieja is Awarded "FindingPheno" Project Grant

This "Leadership in Enabling and Industrial Technologies" project is composed of an international team of seven research groups. The team expects to show how to improve the effectiveness of microbiome interventions in sustainable food production, and simultaneously, offer avenues for quick and easy application of this new approach to other relevant biotechnology-based industries.

European Commission | Horizon 2020 European Union funding for Research & Innovation

Outreach ✖

"LaMAA – Metacognition Laboratory: Aprender a Aprender" Online Courses

This science-education project for high school students was born from the collaboration between CF, the TreeTree2 Association, and the Instituto Superior Técnico (IST), with a common motivation – to teach new areas of knowledge in an innovative and creative way.

As a consequence of the pandemic, the initial face-to-face sessions had to be adapted to an online format. After an intense period of preparation, a Neuroscience and a Machine Learning course were launched on IST's MOOC (Massive Open Online Courses) platform. Since then, a staggering number of around 1000 users have already registered, mirroring the broad interest Portuguese students have in these topics.

09
Mancoo et al. ⬦
Understanding spiking networks through convex optimization. Advances in Neural Information Processing Systems 34. (Theoretical Neuroscience lab)

"la Caixa" Foundation & Fundação para a Ciência e Tecnologia Grant ⬥

10
Colloquium ▼
Elaine Hsiao (UCLA Department of Integrative Biology and Physiology). Interactions between the microbiome and nervous system during early development

Berger & Machens ⬦
Compact task representations as a normative model for higher-order brain activity. Advances in Neural Information Processing Systems 35. (Theoretical Neuroscience lab)

11
CR Winter Party ★

14
CISS ▼
William Podlaski (Theoretical Neuroscience lab)

BBIS ▼
Gérard Karsenty (Columbia University). Blurring the boundaries between neuroscience and organismal physiology

A Joint "la Caixa" Foundation and FCT Grant Awarded to the Immunophysiology Lab

This project is one of 25 biomedical research projects selected for the "la Caixa" Health Research 2020 Programme, which has a total fund of 18 M€. The selected project aims to understand the interactions of the neuroimmune system during infection in animal models, and to explore the molecular mechanisms of this communication, specifically in pulmonary circuits during respiratory infections.

"la Caixa" Foundation

Dec

14
Weekly COVID-19 Antigen Testing of CR Members Begins ☀

15–16
Portuguese Drosophila Meeting (DrosTuga) 2020 ▼
Organisers: Lara Carvalho (CEDOC), Catarina Brás Pereira (CR), Carla Lopes (i3S), Leonardo Guilgur (IGC)

16
Carsetti et al. ♦
Different innate and adaptive immune responses to SARS-CoV-2 infection of asymptomatic, mild, and severe cases. Frontiers in Immunology. (Immunotherapy/ ImmunoSurgery lab)

17
Colloquium ▼
Gyorgy Buzsaki (New York University, Langone Medical Center). Ways to think about the brain

PhD Defence ▼
Danbee Kim (Intelligent Systems lab). On the aims and methods of Field Neuroscience: Non-invasive techniques for studying nervous systems in natural settings

28
Lanini et al. ♦
COVID-19 disease – Temporal analyses of complete blood count parameters over course of illness, and relationship to patient demographics and management outcomes in survivors and non-survivors: A longitudinal descriptive cohort study. PLOS One. (Immunotherapy/ ImmunoSurgery lab)

Open Hearts Donation Campaign ★
To end the year on a positive note, the Communications Events & Outreach Team organised a solidarity campaign called "Open Hearts". During the campaign, members of the entire CCU community contributed a great number of items, including food and clothes
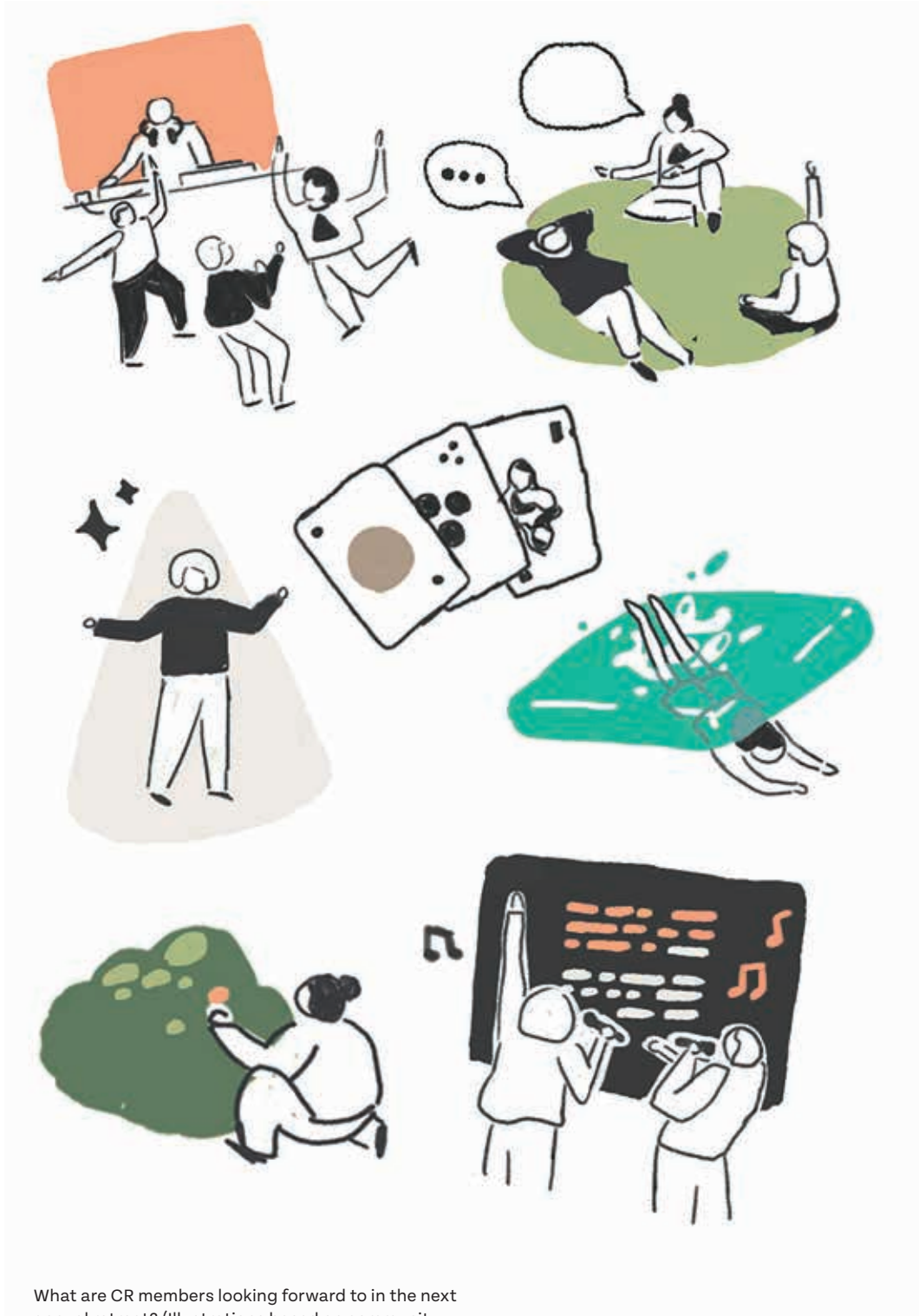
What are CR members looking forward to in the next annual retreat? (Illustrations based on community feedback for the 2020 CR Retreat Celebration).

Our Research Groups

Neuroscience

Cancer & Physiology

Experimental and Clinical Research

Neuro science
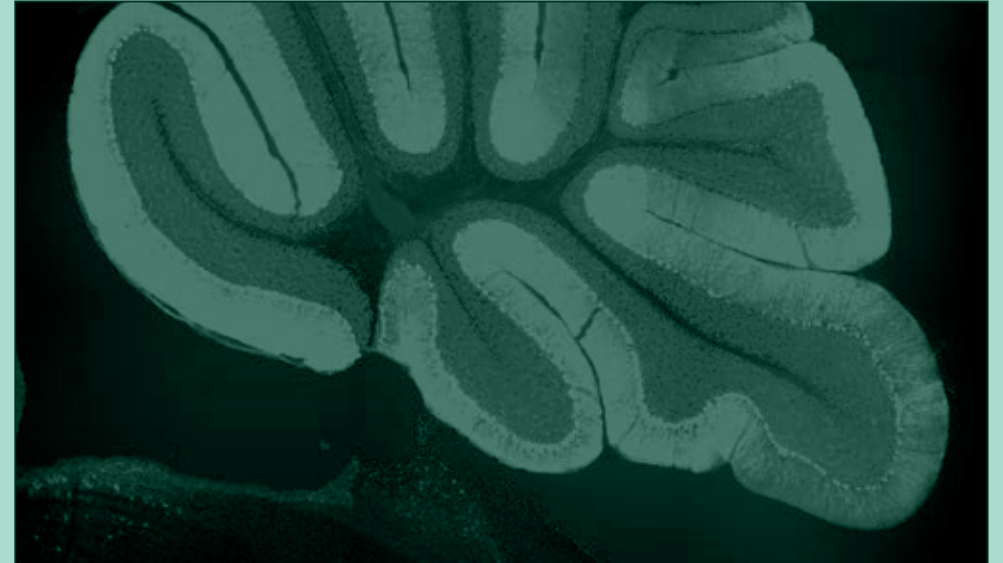
Mouse cerebellum (Neural Circuits & Behaviour lab)

13 groups

Megan Carey

Neural Circuits & Behaviour

Postdoctoral Researchers
Dana Darmohray
Jorge Ramirez
Hugo Marques
Ana Sofia Machado
Catarina Albergaria

PhD Students
Merit Kruse
Jovin Jacobs
Diogo Duarte
Ana Gonçalves
Rita Félix (Co-Sup. M. Orger)
Tatiana Silva
Teresa Serradas Duarte
(Co-Sup. J. Paton)

MSc Students
Guilherme Pata
Pedro Castelhanito
Inês Ribeiro

Technicians
Marta Maciel
Ana Colaço

We combine quantitative behavioural analysis and neurophysiology with genetic tools to understand how cerebellar circuits enable complex, coordinated movement. 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; Albergaria et al., eLife 2020); and establishing a paradigm for locomotor learning in mice (Darmohray et al., Neuron 2019).

One of the research articles we published in 2020 is Albergaria et al., eLife 2020. Both humans and mice with altered cannabinoid signaling exhibit deficits in learning and memory. Many studies support the idea that cannabinoids mediate neural plasticity, or experience-dependent changes in the connections between neurons. It was previously thought that alterations in these forms of plasticity were responsible for the learning impairments. However, in 2020, Catarina Albergaria and colleagues from the lab showed that cannabinoids influenced cerebellar learning through indirect effects on behavioural state, and not through direct effects on neural plasticity. These results highlight behavioural state as a powerful independent means through which individual genes contribute to complex behaviours.

Eugenia Chiappe

Sensorimotor Integration

Postdoctoral Researchers
Claire Rusch
Paavo Huoviala
Terufumi Fujiwara

PhD Students
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Mert Erginkaya
Miguel Paço
Nuno Rito
Tomás Cruz

Research Technicians
Margarida Brotas
Nélia Varela
Saliha Ece Sönmez
Sebastián Malagon
Wynne Stagnaro

Locomotion is fundamental for survival, and requires exquisite coordination of sensory and motor signals within brain and spinal cord circuits. Yet, how central nervous systems orchestrate sensory and internal signals for coordinated and goal-directed movement is poorly understood. We address this question by studying how vision controls walking in flies in different behavioural contexts. Using a combination of methods, we are examining how visuomotor circuits encode self-motion information, and how this information is used to steer the fly following her behavioural goals. Taking advantage of the genetic tools of the fly, and her compact nervous system, we take a wide-brain approach to map activity in different brain regions to different aspects of behaviour. Ultimately, we aspire to develop a mathematical explanation of activity dynamics and their effect on behaviour, and to construct agents that move like a fly.

In the past decade, the analysis of animal behaviour has become a common approach in basic neuroscience thanks to the application of machine learning and computer vision tools. More and more neuroscientists— including our team—are finding that important details of behaviour involve subtle repetitive actions that are recognised by our brains, but hard to quantify even under unsupervised strategies. This is because these subtle actions are embedded in a continuum of movement trajectories performed in a world full of uncertainties. This property makes the characterisation of actions a challenge as similar actions are rarely executed along identical trajectories. In a project posted on bioRxiv in 2020 (Bohnslav et al.), we leveraged supervised deep-learning models to identify subtle actions that are of interest and pre-determined by a researcher. Our method, DeepEthogram, works with raw video pixels and does not require pre-specification of body features, and therefore, it operates fast while maintaining high accuracy.

Rui Costa

Neurobiology of Action

Postdoctoral Researchers
Ana Cruz
Andreas Klaus
Catarina Carvalho
Cristina Afonso
Cristina Álcacer
Daniela Pereira
Nicolas Morgenstern
Rodrigo Oliveira
Vítor Paixão

PhD Students
Nuno Loureiro
Ivo Marcelo
Marcelo Sousa

Technicians
Sara Abalde
Tatiana Saraiva

We have been mostly interested in understanding the circuits and the mechanisms underlying the generation of self-paced actions, and the reinforcement and refinement of actions into complex action repertoires based on the consequences of their execution. Understanding this adaptive process – how actions are learned through trial and feedback – requires mechanistic insight into how actions are initiated, how they can be selected/re-initiated, and how feedback can refine their execution and organisation. Our lab has developed and leveraged genetic, electrophysiological, optical, and behavioural approaches to gain this mechanistic insight. We pioneered, for example, multi-site electrophysiology, fiber photometry, operant closed-loop brain-machine interfaces in rodents, inertial sensors for behavioural classification, to understand basal ganglia function in motor learning and control. The findings from our studies also have implications for movement disorders like Parkinson's Disease, and psychiatric disorders like Obsessive-Compulsive Disorder.

In 2020, we published several research articles, among them is a mice study in the journal Cell (Botta et al.), where we discovered brain cells that identify familiar locations. In this study, we monitored the activity of cells in a brain region called the amygdala while mice were freely exploring their environment. As the mice became more familiar with their surroundings, we observed an experience-dependent increase of momentary arrests in certain locations. Interestingly, when mice stopped in these locations, certain cells would become active. Furthermore, when we artificially activated these cells, the animal would pause. And vice versa, when we deactivated these cells, the animal would never pause. These results uncovered an amygdala circuit that mediates momentary arrests in familiar places, a behaviour that is common to mice and humans alike.

costa-lab.org

Gonzalo de Polavieja

Collective Behaviour

Postdoctoral Researchers
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Francisco Heras
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PhD Students
Dean Rance
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MSc Students
Madalena Valente
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Technician
Nuno Ferreira

We are studying two problems: collective decisions and novel mathematical approaches to learning. For the study of collective decisions, we are developing new deep learning methods to extract trajectory data from our own experiments of collective behaviour in zebrafish, so we can obtain the relevant behavioural variables and to build models. Using symbolic regression, these models can be distilled into interpretable models that we can then compare with more hypothesis-driven models. With Michael Orger (CR), we are studying which neuronal circuits underlie these behaviours.

For the study of learning, we have created a metamathematical approach. It has two components: a formal language that expresses which requirements or assumptions we want to have in the learning system, and the model in which these requirements are valid. Out of the possible models, we prove that there is a particular one that has special properties for learning (for example, with enough data it is guaranteed to find a simple model if it exists). These models are obtained using algebraic approaches, and statistics is pushed to the very end to extract a generalising model from the algebraic models. The approach is very transparent mathematically (it allows deriving theorems more easily) and we are investigating hardware solutions to run it efficiently.

polaviejalab.org

Susana Lima

Neuroethology

Postdoctoral Researchers
Bertrand Lacoste
Constanze Lenschow
Francisco Esteves
Jonathan Cook
Luís Moreira
Nicolas Gutierrez

PhD Students
Ana Rita Mendes
António Dias
Basma Husain
Baylor Brangers
Inês Dias
Silvana Araújo
Susana Valente

MSc Student
Carolina Duro

Technicians
Margarida Duarte
Liliana Ferreira

In our lab we use the house mouse as a model system to investigate different facets of sexual behaviour. In females, we are interested in understanding how sex hormones alter the functioning of hypothalamic circuits and ultimately behaviour, such as that females are only receptive to males when fertile. In males, we are trying to understand how ejaculation is achieved and how ejaculation triggers the refractory period.

In 2020, one of the research articles we published was on the topic of assortative mate choice (Moreira et al.). The choice of a partner that is similar to oneself in some trait, has been described in many different taxa and it is considered a fundamental reproductive barrier that maintains species intact.

But how does that happen? Does it work by telling you what is a correct partner or by preventing wrong choices? Sexual imprinting, which is the learning of sexually relevant cues from your family, is thought to be one of the main processes supporting assortative decisions. We studied this process by performing fostering experiments between two subspecies of mice.

Our results show that females tend to prefer males from the subspecies they first encounter, even if they are of a different subspecies. This suggests that one of the main roles of sexual imprinting is, rather than pointing animals into the right decisions, is to correct cognitive biases that occur during sampling and decision making.

lima-lab.org

Christian Machens

Theoretical Neuroscience

Postdoctoral Researchers
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Nuno Calaim
Adrien Jouary
(Co-Sup. M. Orger)
Bertrand Lacoste
(Co-Sup. S. Lima)

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Allan Mancoo
Gonçalo Guiomar
(Co-Sup. J. Paton)
Oihane Horno
(Co-Sup. L. Petreanu)
Michael Pereira
(Co-Sup. R. Costa)
Severin Berger

MSc Students
Vânia Nunes
Juliana Couras

Our lab develops models of information processing in the brain using mathematical analysis and numerical simulations. These tools allow us to formulate our ideas and intuitions in a precise manner and thereby put them to test using real data. Specifically, our team focuses on understanding how populations of neurons learn 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.

Our team also engages in the development of new methods to summarise the activity of neural populations in useful ways and to compare population activity across areas. We work in close collaboration with several experimental labs, both within and outside of the Champalimaud Centre for the Unknown.

In 2020, we published one of our key results, in which we show how networks of spiking neurons can self-organise in order to efficiently represent information (Brendel et al.). Several members of the lab also had the opportunity to present and publish their work at Neurips – the top conference in the machine learning field. Most of the year, the lab was in complete lockdown, and our 'internal' highlights were probably socially-distanced lab meetings in the Tapada das Necessidades or the Champalimaud amphitheater.

machenslab.org

Zachary Mainen

System Neuroscience

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.

Rats and mice provide flexible animal models that allow 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.

Lab Manager
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Research Associate
João Marques

Postdoctoral Researchers
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Adrian Razvan Sandru
Cindy Poo
Fanny Cazettes
Guido Meijer
Hanne Stensola
Julia Huntenburg
Mattia Bergomi
Romain Ligneul
Tor Stensola

Scientific Programmer
Olivier Winter

Data Architect
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Jaime Arlandis
Kcénia Bougrova
Pietro Vertechi
Solène Sautory
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Eleni Smaradgi
Inês Laranjeira
Margarida Duarte
Megha Patwa
João Morais

Visiting Researcher
Giorgio Gristina

mainenlab.org

Marta Moita

Behavioural Neuroscience

When faced with a threat, an animal must decide whether to freeze, reducing its chances of being noticed, or to flee to the safety of a refuge. Animals choose between these alternatives in a manner that largely depends on the context in which the threat occurs. Contextual cues include the social and spatial features of the environment, as well as the internal state of the animal. The mechanisms by which these cues are integrated to guide the animal's choice and how that choice is implemented, from neuronal activity to muscle contraction and visceral responses, is still far from understood. To address this question we use the fruit fly, a powerful model organism that allows a truly integrative approach, whereby we study from collective behaviour all the way to detailed mechanistic account of the changes taking place in the whole organism when facing a threat.

In 2020, we advanced in our understanding of individual defensive responses. In Ferreira et al., we demonstrated that flies use the movement of others as a social cue of safety. This finding represents an important advance in the field, as there is ample evidence of social buffering of fear in the wild and in the lab. However, until now, the cues mediating this phenomenon were unknown.

Another discovery addressed how the body's internal state adjusts to impending danger. In a preprint (Barrios et al.), we reported that when flies are faced with an inescapable threat, their choice of running versus freezing is accompanied by distinct cardiac activity profiles. Full analysis of our results contradicts two widespread views: that cardiac deceleration while freezing has first evolved in vertebrates, and that it is energy sparing. Our findings revealed that freezing is costly, yet accompanied by cardiac deceleration, and points to heart activity as a key modulator of defensive behaviours.

Postdoctoral Researchers
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Ricardo Neto Silva

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Matheus Farias
Mirjam Heinemans

MSc Student
Sofia Silva

Technicians
Catarina Mendes
Charlotte Roscher
Rui Gonçalves

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grupo-behavioral-neuroscience**

Michael Orger

Vision to Action

Our lab uses a combination of advanced optical, genetic and behavioural methods in zebrafish. Zebrafish are an attractive model system, as they exhibit a robust set of instinctive visually guided behaviours, while their brain, which follows a typical vertebrate pattern, is sufficiently small and transparent so that the activity of each of its neurons can be recorded non-invasively. We image neural activity, while performing high-speed behavioural tracking to make a detailed, quantitative analysis of visually-evoked swimming and eye movements. In addition, we develop genetic tools in order to probe and manipulate defined circuit elements with high specificity.

Recently, our team has developed a high-speed, real-time tracking system that has allowed us to systematically characterise the swimming behaviour of zebrafish larvae in response to a variety of different stimuli. Using a computational approach to behaviour classification, called unsupervised machine learning, we have identified a core set of swimming movements and demonstrated how they are used flexibly across different behaviours.

Social experience during early development can have strong effects on subsequent behaviour. In 2020, we published a research article demonstrating that the effects of social isolation can be observed even in larval zebrafish (Groneberg et al.). We found that week-old fish avoid each other at larger distances due to a change in their response to mechanosensory stimuli. At this stage they are still small enough to allow functional imaging of the whole brain at single cell resolution, opening up new possibilities to study these complex social phenomena in a vertebrate model.

Research Associates
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Sabine Renninger

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Elena Hindinger
Jens Bierfeld
Joaquim Contradanças
Rita Félix (Co-Sup. M. Carey)
Thomas Mullen

Senior Technicians
Aaron Ostrovsky
Edite Figueiras

Technicians
Alexandre Laborde
Bernardo Esteves
Pedro Tomás Silva
Lucas Soares

Intern
Inês Fernandes

**fchampalimaud.org/researchfc/groups/
grupo-vision-to-action**

Joe Paton

Learning

Adaptive behaviour requires learning about the structure of the environment and combining it with past experience to guide decisions. The basal ganglia are a collection of brain areas that are thought to be critical for these processes and their dysfunction is associated with neurological and neuropsychiatric disorders. We apply a range of approaches in rodents to determine the computations involved in behaviour and how they are embedded in neural circuitry involving the basal ganglia.

In 2020, the lab posted three preprints, currently in various stages of revision for publication. One of these (Cruz et al.) focuses on the functional roles of the two main projection cell types in the striatum in action production and suppression. The conclusions of this study have important implications for understanding the role of distinct basal ganglia circuits in behavioural control, and the deficits associated with diseases of the basal ganglia such as Huntington's or Parkinson's Disease. In the process of revision of this work, we performed a series of neuronal recordings during which cell identity information was gathered with optogenetic "tagging". These experiments revealed that the patterns of activity previously observed using population imaging techniques actually arose from the summation of several distinct activity patterns.

Another interesting project developed during 2020, is a joint study with the Theoretical Neuroscience lab, where we constructed an anatomically informed computational model that can be trained to perform the learning task employed in our experiments. This model has revealed a potential mechanism by which parallel processes might interact to produce accurate performance of the task and has reflected the power of collaboration between theorists and experimentalists to address deep questions regarding the neural basis of behaviour.

Postdoctoral Researchers
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Pawel Bujalski

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Filipe Rodrigues
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Mauricio Toro
Renato Sousa
(Co-Sup. R. Oliveira)
Gonçalo Guiomar
(Co-Sup. C. Machens)
Sofia Freitas
(Co-Sup. A. Renart)
Teresa Serradas Duarte
(Co-Sup. M. Carey)

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Daniela Domingues
Francisco Azevedo
Margarida Duarte
Margarida Pexirra

patonlab.org

Leopoldo Petreanu

Cortical Circuits

Postdoctoral Researchers
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Flora Vasile
Marina Fridman

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Gabriela Fioreze
Hedi Young
Oihane Horno
Radhika Rajan
Rodrigo Dias

MSc Student
Beatriz Moura

Technician
Margarida Baeta

Our brain is constantly interpreting the environment around us to plan and guide our actions. This requires combining often noisy and contradictory sensory inputs with internal models of the world. We study how this process emerges from networks of neurons in the mouse brain, with a focus on the neocortex. Despite its uniform appearance, the neocortex is a complex network of specialised areas. We dissect how these areas interact to combine sensory stimuli and internal factors to give rise to perception.

We study the cortical areas that are required for visual perception. Using advanced optical methods, we study axons linking distant areas of the neocortex. We map their connectivity, record the signals they relay and manipulate their activity in animals performing visual tasks in order to understand the logic of inter-areal interactions.

In 2020, Flora Vasile joined the lab after completing her PhD in Paris. She will be working on the role of looped cortico-cortical interactions in sensory processing and learning in mice doing a visual navigation task.

petreanulab.org

Alfonso Renart

Circuit Dynamics & Computation

Postdoctoral Researchers
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João Afonso

PhD Students
Anh Nguyen
Ana Mafalda Valente
Juan Castiñeiras
Naz Belkaya
Raphael Steinfeld

MSc Student
Íris Damião

Technicians
André Monteiro
Ricardo Monteiro

We study simple auditory decisions where both stimuli and behaviour can be measured quantitatively. Our approaches include psychophysical tasks in rodents and humans, theoretical analysis, and manipulation and recording of neural activity in rodents. We currently focus on three problems.

We are interested in the neural basis of psychophysical laws, which describe mathematical regularities in perceptual decision-making. These regularities provide strong constraints for the identification of the relevant computations and their neural implementation. We also have been exploring how changes in the pattern of spontaneous brain activity affect both neural representations and the accuracy of perceptual decisions. Finally, we study decision making from a normative perspective, exploring how decision makers should behave in order to attain their goals in the light of various structural and physiological constraints.

In 2020, we made progress towards understanding how ongoing spontaneous activity in the cortex affects an individual's ability to make fine perceptual judgements. In our experiments, we repeatedly present sounds to mice, and they tell us whether each sound has a high or low pitch. Surprisingly, we find that spontaneous cortical activity before the sound is presented affects how accurately the animals discriminate the sounds, but only if the previous discrimination was incorrect. We hypothesise that when we learn that we just made a wrong decision, our brain approaches the next decision in a different manner.

renartlab.org

Carlos Ribeiro

Behaviour & Metabolism

Lab Manager
Ana Paula Elias

Postdoctoral Researchers
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Darshan Dhakan
Gili Ezra
Ibrahim Tastekin
Raquel Barajas
Silvia Henriques
Zita Santos

PhD Students
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Dennis Goldschmidt
Patrícia Francisco
Rory Beresford

Technicians
Célia Baltazar
Inês Haan de Vicente
Lúcia Serra

The food we eat affects all aspects of our lives, including aging, ability to reproduce, lifespan, mental state and mood. For better or worse, we are what we eat. Yet, how the brain controls food choice is still a mystery. To tap into this problem we work on tackling 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 to implement an integrative neuroscience approach, necessary to solve this whole-organism problem.

In 2020, despite the difficult year, we are very proud to have published two major papers in which we identify novel mechanisms by which both the microbiome and metabolic programmes in organs shape nutrient decisions. In the first study (Henriques et al.) we use a cutting edge metabolomics approach to study how gut bacteria exchange substances (metabolites) allowing them to cope with nutritionally imbalanced host diets and alter food choice behaviour. In the second study (Carvalho-Santos et al.) we identify how an organ (the female germline) changes how it uses nutrients and how this change forces the brain to choose to eat more sugar. This is a novel mechanism by which organs can dictate to the brain what the animal should eat.

Also, I was honored to be elected Secretary-General of FENS for the mandate of 2022-2024, allowing me to serve the wide European neuroscience community.

Illustration caption (vertical): Cells in the brain of a fruit fly (Cell Fitness lab)

ribeirolab.org
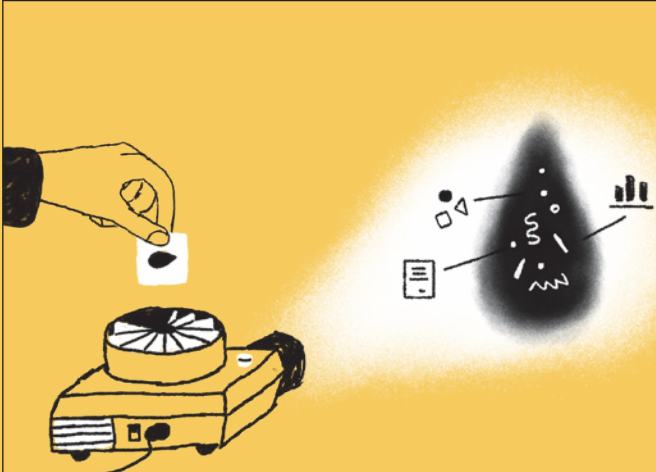
Cancer & Physiology

Since 2015
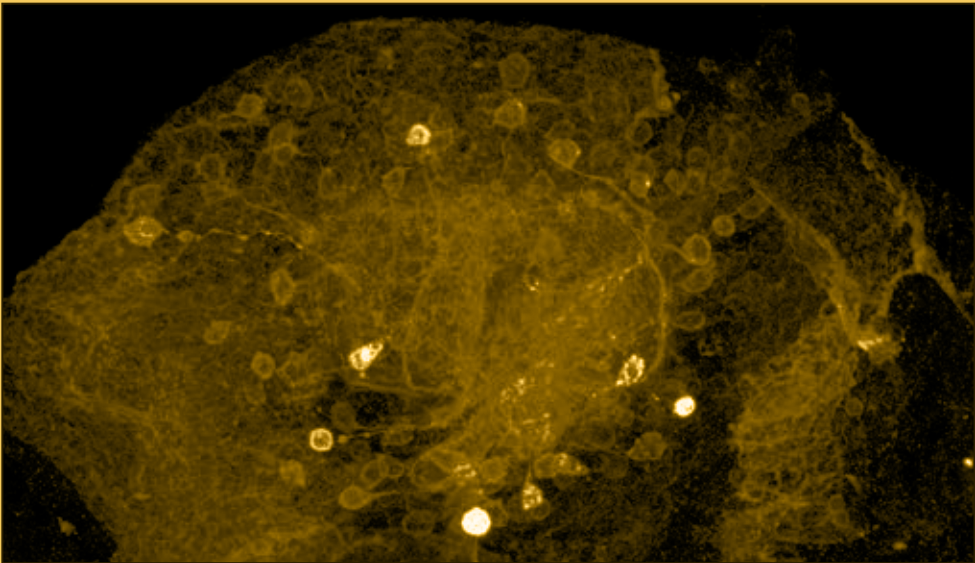
Cells in the brain of a fruit fly (Cell Fitness lab)

5 groups

Bruno Costa-Silva

Systems Oncology

Postdoctoral Researchers
Ana Gregório
Sílvia Baptista
Maria Carolina Strano Moraes

PhD Students
Inês Coelho
Joana Maia
Julia Elzanowska
Nuno Couto

Technician
Cristian Bodo

Our group focuses on the identification of new biomarkers, measurable in blood tests, that enable early detection, characterisation and follow-up of cancer in clinical settings. We also study the potential roles of extracellular vesicles (EVs - structures produced by all cells that mediate cell-cell communication) as cancer biomarkers and mediators of cancer metastasis.

As part of our work, we recently published a paper on a new vesicles flow cytometry method we developed. This new tool, which analyses nanosized particles, enables expedited study of EVs populations in biofluids in a fraction of the volume and time required by conventional methods, multiplying by hundreds the number of tests in a single sample collection. We are applying this method for EVs-based liquid biopsies of tumour and tumour associated cells. Specifically, in collaboration with CCC's Digestive unit and Vall d'Hebron Institute of Oncology (Barcelona), we are currently applying this strategy to test whether we can predict and early detect response to therapy in pancreatic cancer patients with localised and metastatic disease. For that, we are analysing longitudinally collected patient plasma EVs populations carrying specific proteins identified by our group linked with presence of tumour or tumour-associated cells.

In 2020, we also discovered that pancreatic cancer EVs act on bone marrow immune cells, regulating the expression of tens of genes potentially linked with tumour immunity. We are currently interested in studying if these cells are present in the blood of pancreatic cancer patients and whether they contribute to the malignancy of this tumour.

costasilvalab.org

Eduardo Moreno

Cell Fitness

Postdoctoral Researchers
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Catarina Brás Pereira
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Esha Gogna
Mario Aguilar
Rajan Gogna

PhD Students
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Irene Argudo
Maria Carolina Rodrigues
Maria Bettencourt
Mariana Reis

MSc Students
António Palma
Leonor Peixoto
Sofia Martins

Technicians
Joana Couceiro
Andrea Spinazzola
Andrés Gutiérrez
Miguel Pinto
Pedro Durão

Our group studies the mechanisms of cell competition in processes such as ageing, development, tissue regeneration and cancer. Through the years, we've gained great insight into these mechanisms, including the identification of "fitness fingerprints", a molecular code by which neighbouring cells recognise and eliminate less-fit cells. We showed that this process happens during ageing, regeneration and cancer. We also discovered a new type of competition named "mechanical competition" in which high density of cells leads to compression of tissue and thereby to cell elimination.

In 2020, we published a study on Cell Fitness and Alzheimer's Disease in the journal iScience (Coelho and Moreno). During adult life, damaged but viable neurons can accumulate in the organism, creating increasingly heterogeneous and dysfunctional neural circuits. An intriguing example of this phenomenon is the aberrant increased activity of cerebral networks detected in vulnerable brain regions during preclinical stages of Alzheimer's Disease. We found that a unique cell selection mechanism is able to target and remove aberrantly active neurons generated by heterologous human amyloid-β in Drosophila (amyloid-β is the main component of the plaques found in the brains of patients suffering from Alzheimer's Disease). Specifically, our results demonstrate that sustained neuronal activity is sufficient to compromise neuronal fitness and upregulate the expression of the low fitness indicators in the fly. Conversely, forced silencing of neurons restores brain fitness and reduces amyloid-β-induced cell death. The manipulation of this cell selection process, which was already proved to be conserved in humans, might be a promising new avenue to treat Alzheimer's Disease.
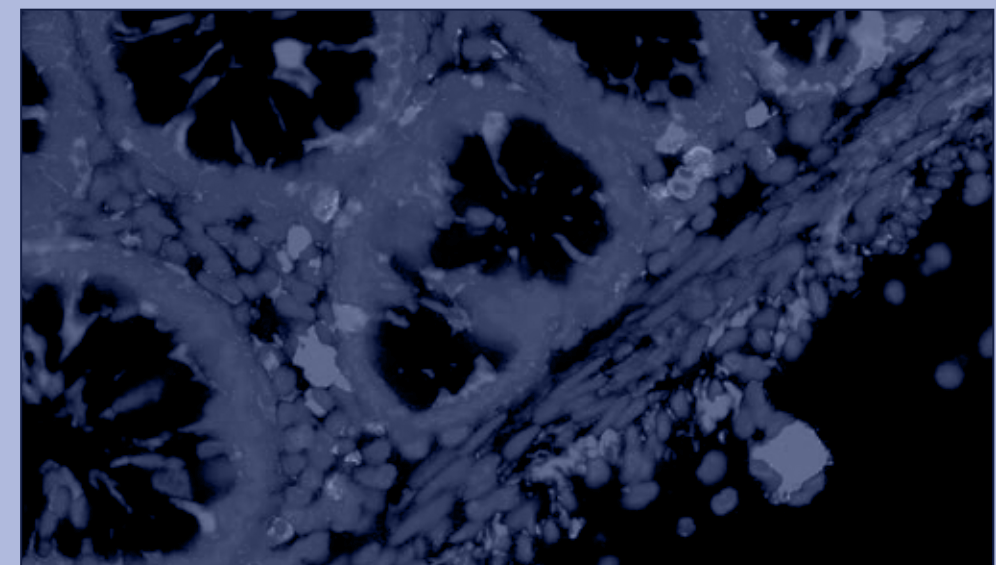

moreno-lab.org

Christa Rhiner

Stem Cells & Regeneration

Postdoctoral Researcher
Marta Neto

PhD Students
Anabel Rodriguez Simões
Mariana Santos

MSc Students
Margarida Caio
Marta Lopes da Costa

Technician
Carolina Alves

Brain injuries are a leading cause of disability worldwide and are associated with a high socio-economic burden as treatments to help brain restorative processes are largely inexistent. The mammalian brain contains adult neural stem cells, which are a source of new neurons, but the majority are kept in a state of reversible cell cycle arrest, also called quiescence. Most quiescent neural stem cells (qNSCs) fail to activate upon injury and drive an effective repair response.

We use fruit flies to analyse reciprocal interactions between stem cells and their surroundings (neurons, glia, immune cells, airways) to extract essential stem cell enabling signals. In parallel, we dissect injury-induced programmes within qNSCs that show robust division following injury as is the case in flies. We use principles from neuroscience, stem cell biology, transcriptomics, genetics and physiology to unravel brain plasticity. We also strive to translate learnt principles into mouse models to establish conserved stem cell enabling mechanisms (StEMs) and develop strategies to increase limited regeneration in the mammalian brain.

In the past year, we demonstrated that mechanical brain lesions in the fly recapitulate numerous hallmarks of brain injury in patients such as activation of stress signaling, neuronal calcium influx, burst in extracellular reactive oxygen species, pentose phosphate pathway upregulation, local hypoxia and metabolic changes in glia. Using an in-vivo oxygen sensor protein, we could visualise transient hypoxia in the lesioned brain area and show that hypoxia-dependent transcription factors control the production of an important stem cell enabling cue in the adult fly brain, a mechanism that seems to be conserved in mammals.

rhinerlab.org

Adriana Sánchez-Danés

Cancer & Stem Cell Biology

Adriana Sánchez-Danés is the ERA Chair of the EU-funded QuantOCancer project (Grant Agreement # 810653).

Postdoctoral Researchers
Raquel Tomás
Sandra Blasco
Adán de Salas

PhD Student
Ana Sofia Marques

MSc Student
Erik Cardoso

Technicians
Patrícia Borges
Raquel Soares

In the lab we combine in vivo and in vitro approaches in order to uncover the mechanisms leading to tumour initiation and resistance to therapy in two of the most common cancers in humans. The Basal Cell Carcinoma, a skin cancer and the most common cancer in humans, and Medulloblastoma, one of the most frequent pediatric brain tumours.

In 2020, we were very happy to win the Maratona da Saúde Award. The financial support that we received from this non-profit organisation was essential to start a new project aimed at identifying the mechanisms that lead to treatment resistance in patients suffering from Medulloblastoma. To successfully accomplish this project, we are really lucky to count with the collaboration of a well-known neurologist, Dr. José Maria Bravo Marques, working at the CCC.

We also want to highlight that we are really excited to collaborate with the group of Dra. Cristina João in a project aimed at establishing organoids to model Multiple Myeloma in vitro.

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grupo-cancer-and-stem-cell-biology**

Henrique Veiga-Fernandes

Immunophysiology

We explore the role of cross-talk between neurons and the immune system in the prevention and resolution of disease. To that end, we focus 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, we have been exploring the surprising role of the neural network that surrounds these organs: immune regulation. We 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, setting the immune response in motion. These findings may have tremendous potential in the design of novel therapeutic approaches to disease as they pinpoint new selective targets that can be harnessed in infection, metabolic disorders and cancer.

In 2020, we were one of the winners of the "Fundamental Research Category", following our groundbreaking work on the interaction between the immune and nervous systems. The award highlighted a discovery which was published in the scientific journal Nature in 2019 (Godinho-Silva et al.). In this study, we focused on the relation between the immune system and a brain area that controls the body's physiology across the day-night cycle, known as the "brain's clock". This work revealed how the activity of a type of immune cells called ILC3 depends on an individual's biological rhythm, and how the disruption of this rhythm might lead to conditions as diverse as cancer, obesity and chronic inflammatory diseases. This realisation may be useful for developing new therapeutic approaches. You can read more about this work in a review we published last year (Huh & Veiga Fernandes).

Lab Manager
Hélder Ribeiro

Postdoctoral Researchers
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David Brea Lopéz
Julie Chesné
María Martínez-Lopez
Marko Šestan
Roeland Wolterink
Roksana Pirzgalska
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Miguel Rendas
Raquel Silva

MSc Student
Valentin Dettling

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Bruno Raposo
Ericka Dinis
Filipe Delgado
Inês Godinho
João Santos
Marta Batista
Margarida Nunes
Sara Correia
Vasco Correia

Visiting Researchers
Covadonga Paneda
David Malta
Manuela Ferreira
Patrícia Bastos
Pedro Andrade

veigafernandeslab.org

Experimental & Clinical Research

Since 2019

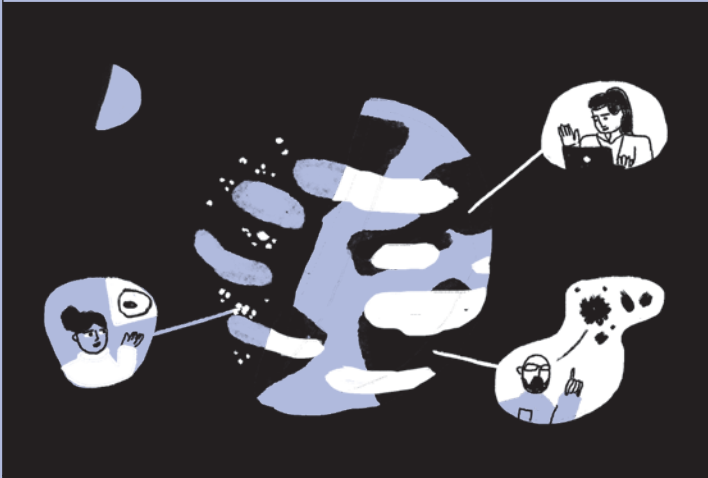Human colon cancer specimen with surrounding immune cells (Immunotherapy / ImmunoSurgery lab)

8 groups

Mireia Castillo-Martin

Molecular & Experimental Pathology

Our lab has the main objective of studying tissue samples using cutting-edge technologies, with the purpose of pursuing different scientific hypotheses. The goal of our research is the characterisation of specific molecular signatures in samples of human neoplastic tissues, combining genomic and phenotypic information, the latter obtained through multispectral immunofluorescence.

We focus on studying the different cells in the tumour microenvironment (immune cells, such as T cells, NK cells and macrophages as well as fibroblasts), to understand the mechanisms of immune escape and to develop new therapeutic approaches to overcome it.

2020 has been the year of the COVID-19 pandemic with all its nuances, but we have been quite lucky: Andreia Maia, MSc was awarded a PhD grant from the FCT to develop her project on NK cells as instruments for cancer treatment, and we have welcomed two new MSc Students, Ana Borralho and Sara Cascais, who have integrated very well in the team. The group has been working hard and we expect to get some of our results published during 2021. Furthermore, this year we have strengthened our collaboration with the CCC's Digestive Unit, the Immunotherapy / ImmunoSurgery lab and the Systems Oncology lab at the CCU, as well as with other international research laboratories (Spain, France).

Research Assistant
Javier Martin

PhD Student
Andreia Maia

MSc Students
Ana Borralho
Sara Cascais
Cátia Rebelo

Technician
Inês Franco

Visiting Researcher
Stefani Domentean

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grupo-molecularexperimentalpathology**

Durval Costa

Radiopharmacology

Nuclear Medicine uses radiopharmaceuticals – molecules labeled with radionuclides in the diagnosis and/or treatment of diseases. 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, current methods are sometimes insufficient. For that reason, we are working hard on the development of new quantitative approaches following improved image processing analysis.

We regard ourselves as a translational research group, focused on patient needs and on direct and immediate application of our research methods and results. Ultimately, we want to promote better diagnoses, improve prognostic biomarkers and develop new treatments with better outcomes for patients. For instance, one line of work in our lab aims to improve the accuracy of the amount of radiation to be administered to the tumour/patient so that unwanted and deleterious secondary effects are minimised, while the destruction of the tumour is maximised. The synthesis in-house of radiopharmaceuticals that are not commercially available or too expensive to buy, as well as the development of new ones, is another important goal of our team. This may allow better diagnosis and treatment using state-of-the-art biological targets defined radiopharmaceuticals with added benefit to patients.

For 2020, we would like to highlight the beginning of the construction of our new radio-pharmacy. When finished and totally equipped, we will be able to produce/synthesise new radiopharmaceuticals under GMP quality and certification. We believe this will have a significant impact in clinical service and research endeavours.

Mathematician
Francisco Oliveira

Physicists
Paulo Ferreira
Mauro Costa
Rui Parafita

Radiopharmacist
Ana Capacho

Nuclear Medicine Physicians
Joana Castanheira
Ângelo Silva
Carla Oliveira (PhD Student)
Sofia Vaz
Ricardo Teixeira

Biomedical Engineer
Cláudia Constantino

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

PhD Students
Sara Ferreira
Jorge Borbinha

MSc Students
Joana Morgado
Raquel Braga
Cristiana Rodrigues
Maria Inês Ribeiro

**fchampalimaud.org/researchfc/groups/
grupo-radiopharmacology**

Rita Fior

Cancer Development & Innate Immune Invasion

![Portrait of Rita Fior]

Postdoctoral Researchers
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Marta Estrada
Raquel Mendes

PhD Students
Mayra Martinez
Vanda Póvoa

MSc Students
Mariana Barroso
Luís Leite

Technicians
Cátia Almeida
Ana Logrado
(Co-Sup. C. João)

Our lab has two main research goals:

The first is to develop tools for personalised medicine. Despite advances in targeted cancer treatments, we still lack methods to predict how a specific cancer in a specific patient will respond to a given therapy. Consequently, patients go through rounds of trial-and-error to find the best treatment, often subjected to unnecessary toxicity. Our lab is developing a system where patient derived tumour-samples are implanted into zebrafish larvae. These "Avatars" are used as sensors for cancer behaviour and personalised therapy screening. We have developed protocols to screen not only chemotherapy and radiotherapy but also a number of targeted biological therapies. To make this project a reality, we gathered a multidisciplinary team, working in close proximity with multiple units within the CCC, the CF Biobank and the Hospital Amadora Sintra.

The second goal of the lab is to study how tumours evade the immune system. Our team is studying the process of innate immune evasion and intra-tumoural clonal interactions using the zebrafish larvae xenograft model. We believe that understanding these processes may lead to new anti-cancer therapies to be combined with immune-checkpoint blockers, increasing efficacy rates and bringing immunotherapy to more patients.

2020 has been a very difficult year, marked by the loss of my mentor and friend Prof. Maria de Sousa to COVID-19, who was always supportive and enthusiastic of our work. But at the same time, 2020 was a very productive and important year, as we published many of the projects that we have been developing in the last few years (something that Prof. de Sousa would have very much approved of) and we also had 3 "Lab Babies"!

![Illustration of hand examining a scientific paper/document next to a coffee mug]

fchampalimaud.org/researchfc/groups/grupo-
cancer-development-and-innate-immune-evasion

Cristina João

Myeloma Lymphoma Research Group

![Portrait of Cristina João]

Postdoctoral Researcher
Emilie Carneiro

PhD Students
Bruna Ferreira
Filipa Barahona
Joana Caetano

MSc Student
Carolina Pestana

Technician
Raquel Lopes

The group studies Multiple Myeloma (MM), the second most prevalent blood cancer where clonal plasma cells proliferate in the bone marrow (BM) and produce monoclonal immunoglobulin.

Currently, we are aiming at finding novel biomarkers for MM in liquid biopsies. During 2020, we completed the accrual of patients for a translational study aiming to use extracellular vesicles (EVs) isolated from peripheral blood as potential prognostic biomarkers. In this study, we analysed EVs from a cohort of patients followed for more than two years. We found, for the first time, the association between EVs' protein cargo and prognosis. Further, we unraveled EVs as a new source of biomarkers for intercepting systemic cellular communications, such as disease-related immune dysfunction. This work is to be published in 2021 in two manuscripts currently under preparation.

The second axis of our work aims to understand the mechanisms involved in MM progression and resistance to treatment. For that, we used an MM mouse model that faithfully recapitulates the major characteristics found in human patients to study the BM immune microenvironment through different techniques, namely flow cytometry and quantitative reverse transcription PCR. In parallel, we continue to collaborate with Fior's group, exploring a zebrafish patient-derived xenografts model to determine in vivo differential sensitivity of patient-derived tumour cells to novel drugs available. The comparison of patient response to treatment to their matching xenografts was used to test the predictability of the model.

In 2020, we presented our work in several meetings. We also established further collaborations both within CR (Cancer & Stem Cell Biology lab) and other research institutions (DNA Breaks at CEDOC and the Technology and Innovation Unit at INSA).

![Illustration of a person at a computer desk viewing research data on a monitor]

fchampalimaud.org/researchfc/groups/
grupo-myeloma-lymphoma

Markus Maeurer

Immunotherapy / Immunosurgery

Postdoctoral Researcher
Joana Lérias

PhD Student
Eric de Sousa

MSc Students
Carolina Condeço
Inês Silva
Jéssica Kamiki
Patrícia António

Technicians
Georgia Paraschoudi
Pedro Noronha

Our lab uses: i) live ex vivo imaging to study the interaction between immune and cancer cells; and ii) deep T-cell receptor sequencing (molecular fingerprint) to examine the diversity of T-cell responses directed against cancer. These platforms enable the objective description of the immunological landscapes, as well as linking immune signatures with clinically relevant endpoints, i.e. increased patient survival.

More robust molecular and functional gauging of anti-cancer directed immune responses aids not only to better understand 'successful' immune responses, it also allows for the rational design of more 'personalised' cellular immunotherapeutic approaches in precision medicine. This research pipeline feeds into the development of clinical applications in anti-cancer directed cell therapies.

In 2020, we would like to highlight the establishment of the Global Cancer and Infectious Diseases Consortium for Host-Directed Therapies. In this consortium, internationally recognised cancer centres and centres for infectious diseases, including CF, work together to change the course of COVID-19 and to explore cross-fertilising knowledge in cancer and infectious diseases using similar molecular and functional analyses.

We contributed to a phase I and phase II study using mesenchymal stromal cells to curb non-productive immune responses and to increase tissue reconstruction in patients with infections. Single cell sequencing revealed how a successful cellular immune response looks like in individuals with COVID-19. Similar methods are used to gauge anti-cancer directed T-cell responses and aid to design more personalised treatment options in host directed therapies for patients with cancer.

fchampalimaud.org/researchfc/groups/
grupo-immunotherapy-immunosurgery

Albino J. Oliveira-Maia

Neuropsychiatry

Lab Manager
Sofia Marques

Senior Scientist
Ricardo Matias

Postdoctoral Researchers
Ana Fernandes
Carolina Seybert
Joaquim Alves da Silva
Julia Queiroz
Margarida Oliveira
Raquel Lemos

PhD Students
Ana Maia
Gabriela Ribeiro
Gonçalo Viegas Cotovio
Pedro Ferreira

MSc Students
Daniel Silva
Francisco Viana

Technician
Libat Weizman

**Clinical Collaborators
& Visiting Researchers**
Bernardo Barahona-Corrêa
Jaime Grácio
João Eusébio da Fonseca
José Maria Bravo Marques
José Oliveira
Luzia Travado
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, with a particular interest in cortico-striatal function and dysfunction, and the relationship with reward-related behaviours. Currently, our main focus is centered 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 highlight of 2020 for the Neuropsychiatry Unit was the award of a 1.5M€ Starting Grant from the European Research Council. The project submitted to the ERC was inspired by the work published by Ana Fernandes earlier in the same year, demonstrating the contribution of post-ingestive stimulation by sugar for instrumental learning in mice, and the underlying viscerosensory pathways, involving the hepatic branch of the vagus nerve. This grant will fund ongoing translational efforts in the laboratory, exploring similar questions in humans, towards understanding dysfunctional feeding behaviours in clinical contexts.

fchampalimaud.org/researchfc/groups/
grupo-neuropsychiatry

Nickolas Papanikolaou

Computational Clinical Imaging

Postdoctoral Researcher
Karri Chiranjeevi

PhD Students
José Maria Moreira
João Santinha

MSc Students
Ana Carolina Rodrigues
Catarina Carvalho
Catarina Alexandra Almeida
Carvalho
Jéssica Catarino

Technicians
João Santinha
Miguel Chambel
Ana Sofia Castro Verde

The main objective of our team is to translate available methods and machine learning algorithms into clinical practice. To achieve the later, a considerable amount of research effort is required to fine tune generic approaches of Artificial Intelligence (AI) and Machine Learning (ML) in the field of medical imaging. In addition, the team is focusing on developing software tools and platforms to deploy and make available AI models to the clinics.

The main highlight of 2020 was the successful application for EU funding of the group concerning the Pro-Cancer-i project. The project is targeting the development of a centralised repository with more than 17000 multi-parametric exams of patients with prostate cancer and 8 clinical use cases will be explored by developing AI models to address the most important clinical problems in the prostate cancer disease continuum.

The COVID-19 situation did not harm our productivity, which was intensified (ten new papers were published in 2020). New methods related to explainable AI have also been implemented within the CCIG to increase trustworthiness of the developed models. Other highlights include my nomination as the Scientific Coordinator of the consortium coordinating AI activities across 20 clinical and technical partners both in Europe and US. I was also invited to organise Radiomics e-learning activities for the International Cancer Imaging Society and the European School of Radiology.

fchampalimaud.org/researchfc/groups/
grupo-computational-clinical-imaging-group

Noam Shemesh

Preclinical MRI

Postdoctoral Researcher
Andrada Ianus
Cristina Chavarrías
Rafael Henriques
Rui Simões
Sónia Gonçalves
Tal Shemesh
Joana Carvalho

PhD Students
Frederico Severo
Rita Gil
Carlos Bilreiro
Anders Dyhr Sandgaard
(PhD student in Aarhus
University, co-supervisor)

MSc Student
Rita Alves

Technicians
Beatriz Cardoso
Francisca Fernandes
Ruxanda Lungu

Clinical Research Fellows
Carlos Bilreiro
Inês Santiago

Visiting Researcher
Joana Cabral

Modulations in neural circuit dynamics and microstructures can translate to functional enhancements, or conversely, to severe functional deficits. We are interested in identifying and investigating the links between such functional modulations, their underlying micro-architectural modifications, and the ensuing behavioural responses in vivo. To this end, we harness ultrahigh field Magnetic Resonance Imaging (MRI) coupled to specificity-endowing tools such as optogenetics and optical microscopy. These offer the opportunity of eliciting activity in circuits of interest, and concomitantly monitoring the ensuing activity in 3D. We further develop and apply novel methodologies based on nonBOLD mechanisms, which can potentially provide much insight into the nature of the activity, as well as probe rather fast dynamics. Microstructures are unraveled via MR methodologies tailored to probe cellular-scale size distributions (in white matter) as well as highly heterogeneous morphologies (in gray matter).

On the other hand, our lab has recently shown that the same MR methods probing microstructural changes provide rich information about the underlying cell processes also in disease models such as cancer or stroke, thus opening up a wide variety of possible applications and stressing their translational importance.

During 2020, the lab managed to overcome the pandemia limitations that had initially dimmed our motivation, and continued producing state-of-the-art methodologies: correlation tensor imaging and SANDI, which provide rich information on the microstructural changes in the brain (e.g. on stroke, on gliomas, Alzheimer's Disease and Parkinson's Disease mouse models. It's also worth to remark Andrada Ianus' tenacity on securing two highly competitive individual fellowships: MSCA European contract and laCaixa Junior Leader "Incoming".


shemeshlab.org

Research Associates

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

Claudia Feierstein
Neural Circuits for Visuomotor Behaviour

Associated with the Vision to Action lab

How does our brain use information to select appropriate behaviours? We address this question by looking at zebrafish, small fish which at the larval stage is small and transparent, making it easy for us to peek into their brains noninvasively. Using state-of-the-art microscopes, we can then image the activity of the whole brain, while tracking behaviour using high-speed cameras. We can then ask: how can the larva's behaviour, or its sensory environment, explain the neuronal activity that we measure?
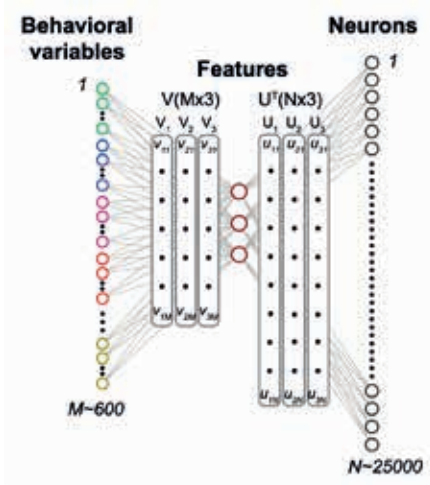

Maria Luisa Vasconcelos
Innate Behaviour

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 they are also quite complex, allowing insight into different levels of organisation. We use a combination of genetic manipulation, behaviour assays and calcium imaging in the fruit fly to address our questions.

Eric DeWitt
### Computational Cognitive Decision Science

Associated with the Systems Neuroscience lab
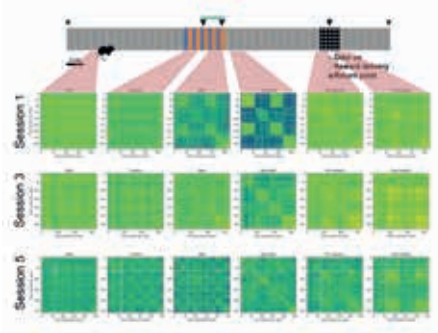
We use computational models to describe learning and decision making behaviour in humans and animals, and then look for the neural activity that reflects the computations predicted by those models. Using this approach, we aim to understand the brain areas that help us make decisions and learn about our world. Our specific focus is on the role of neuromodulators, known to play key roles in learning and decision making, to understand 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 related to the neuromodulatory systems.

Ruth Diez del Corral
Development of Neural Circuits

Associated with the Collective Behaviour and the Vision to Action labs
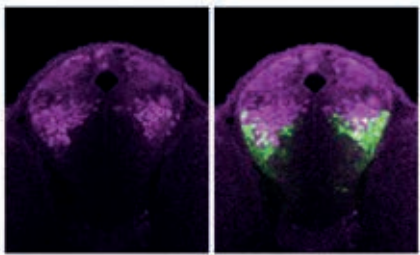
The nervous system is composed of an enormous variety of neurons. Each type of neuron contains a complex molecular machinery and connects to other neuronal types in a very precise manner to perform its functions within the circuits where it participates. We are interested in the spatial arrangement of neuronal subpopulations, how this relates to the morphological and anatomical features of the brain and how it is achieved during embryonic development. We consider that anatomical and developmental approaches to study the brain will contribute and facilitate the understanding of the brain functions. In collaboration with the Orger lab, we are currently focusing on neurons involved in visual processing circuits in zebrafish.

Adjunct & Visiting Scientists

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

Rui Oliveira
Social NeuroEndocrinology

Affiliation: Instituto Superior de Psicologia Aplicada & Instituto Gulbenkian de Ciência

The main research interest of the Social NeuroEndocrinology lab is the integrative study of social behaviour that combines the study of proximate causes (gene modules, hormones, neural circuits, cognitive processes) and ultimate effects (evolutionary consequences). In particular, the team is interested in understanding how brain and behaviour can be shaped by the social environment, and how the cognitive, neural and genetic mechanisms underlying plasticity in the expression of social behaviour have evolved.

Adam Kampff
Intelligent Systems

Affiliation: The Sainsbury Wellcome Centre, University College London

The goal of the Intelligent Systems lab is to identify the general principles of brain function that support intelligent behaviour and to implement them in machines. Specifically, our team focuses 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?
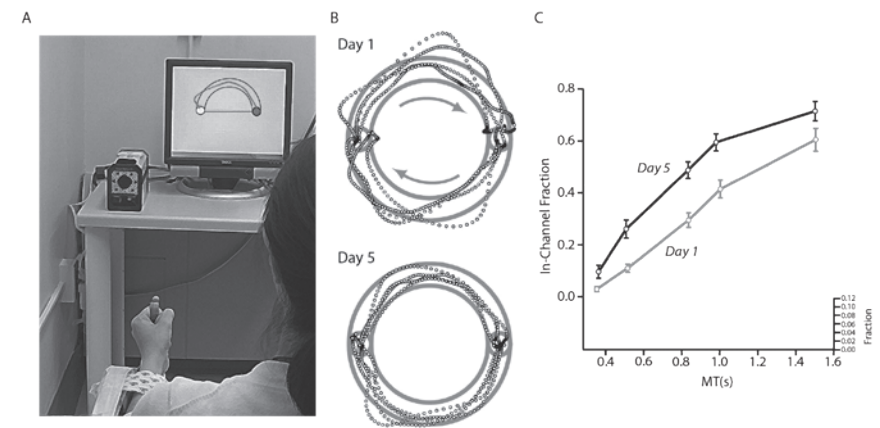
John Krakauer
Cognitive-Motor Interface

Affiliation: Johns Hopkins University School of Medicine

The group's 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.

Dr. Krakauer has been a visiting scientist at the CCU since 2014. He has taught in several summer schools and collaborated with various scientists over this time period, including Rui Costa and Noam Shemesh. He is currently involved in an ongoing project with Joe Paton, Megan Carey and Daniel Nunes investigating the interaction between the motor cortex, basal ganglia and the cerebellum during rodent prehension. Dr. Krakauer is also working with CCU administration and clinicians to enhance the patient experience through the imaginative use of technology.

Research Support

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

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, including the development of sophisticated technologies in animal models; fabrication of hardware, software and imaging tools; and the management of resources and research infrastructures.

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.
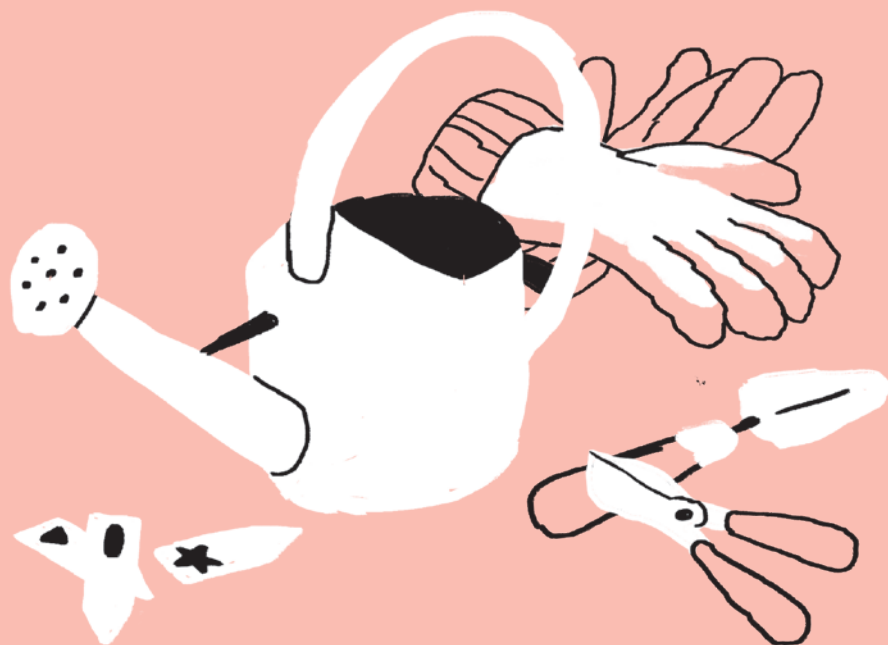
Scientific & Technological Platforms

Many people regard 2020 as a "lost year" where life was put on hold until the long-awaited "return to normality". But that was not the case for CF's Scientific and Technological Platforms. Not only did the Platforms continue supporting research work and ensuring the welfare of all research animals, they also collaborated with the CCC to create the CCU COVID-19 Test Lab. The testing included serological, antigen and PCR analysis for all CCU staff and other external institutions.

Molecular and Transgenic Tools Platform (MTTP)

" In the early beginnings of the pandemic, in March 2020, it was clear that our platform could play a crucial role in the epidemiological management control of both the Champalimaud Clinical Centre and CR.

The MTTP – in collaboration with the Champalimaud Clinical Centre – has set up and got accreditation for the CCU COVID Test Lab which provides molecular diagnosis for SARS-CoV-2 by RT-PCR as well as serological and antigen tests.

Due to the expertise, equipment and infrastructure already used for research services it was quite natural to adapt it to the clinical needs and set up what is now the CF COVID Test lab, part of the national COVID Diagnostic Laboratory Network. This has enabled the CCC to continue treating patients safely and ensure the well-being of all CCU employees.

The COVID Test Lab has also collaborated in the first serological studies made in Portugal, having also taken part of the national effort to test nursing homes. By the end of 2020, between the Champalimaud Foundation's established internal testing protocols and the external joint initiatives, the platform had performed more than 18400 diagnostic RT-PCR tests, more than 4300 antigen tests and more than 5600 serological tests."

Ana Catarina Certal

The MTTP performs complex cloning, gene editing and viral production projects. It assists users during all project stages including conceptual design. The platform 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 CONGENTO.

Coordinator (Group Head): Ana Catarina Certal
Senior Research Technician: Ana Cunha
Molecular Tools Manager and COVID Lab Manager: Ana Raquel Tomás
Research Technicians: Daniela Freire, Mariana Velez
Laboratory Technicians: Alexandra Teixeira, Joana Gomes, Kateryna Kholod, Sara M. Ferreira

Animal Models Platforms

" During 2020, despite lockdowns and curfews, all animals at the CCU continued receiving dedicated care and attention. This continued commitment by the Animal Models Platforms staff, who assumed personal risk to maintain essential tasks on-site, enabled researchers to carry-on critical experiments and studies during the confinement period. It also proved crucial for restarting a normal experimentation schedule in a quick and smooth manner, once confinement measures were lifted.

The CF Animal Platform Contingency Plan, prepared in March 2020, proved highly successful for disease prevention and spread, as no infectious chains occurred amongst animal staff members. Still, staff absences due to sick leaves, quarantine measures, family assistance leaves and others, have taken a great toll on the staff. Importantly, essential and core animal services were never at risk and in some cases, total animal occupancy increased to match the researchers' experimental needs."

Isabel Campos

Fly Platform

The Fly Platform provides state-of-the-art conditions for breeding, maintenance and manipulation of Drosophila to all CR researchers. Apart from the management and maintenance of all shared equipment and spaces, the platform provides technical services ranging from core activities to higher technically demanding procedures.

Importantly, by working closely with other CR Platforms, the Fly Platform is in a position to offer full turnkey projects to its users. Such examples include transgenic and mutant stock generation done in close collaboration with the MTT Platform, and the registry of brain confocal imaging, which is done in close collaboration with the ABBE and Software Platforms.

The Fly Platform is part of the trans institutional infrastructure CONGENTO through which it offers services to external users. External users service demand is predominantly for Drosophila medium production and Fly transgenic production.

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

Fish Platform

The Fish Platform is responsible for state-of-the-art housing and husbandry of CR fish models under high health and welfare standards. In addition, the platform provides an ambitious set of supporting research services, such as generation of transgenic and gene-edited fish among others, and in a close and constant collaboration with the researchers, it facilitates service adaptation to best meet the community needs.

Its commitment to scientific and technological development in the fields of fish husbandry, welfare and applied technologies, has been translated into its own and collaborative projects with national and international institutions, and ultimately in several peer-reviewed publications and presentations at international meetings which has granted the platform important 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.

Coordinator (Head): Ana Catarina Certal
Platform Manager: Joana Monteiro
Animal Technician: Seidy Semedo
Aquaculture Technicians: Carolina Cabrera, Maria João Pereira
Research Technicians: Inês Oliveira, Mariana Sampaio, Olivia Knight

Rodent Platform

The Rodent Platform is primarily responsible for the maintenance and veterinary assistance of all CR rodent animal models. All activities strictly follow European Guidelines, National Laws and Federation of European Laboratory Animal Science Associations 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 3700m2 facility, Rodent Platform staff members are also providing daily care and monitoring of animals during housing and experiments. The Rodent Platform also runs a set of highly specialised and technically demanding services, which are done independently as well as in close collaboration with the MTT Platform.

Coordinator: Isabel Campos
Veterinary: Dolores Bonaparte
Manager: Rita Torre
Assisted Reproduction Technicians: Catarina Craveiro, Ana Pereira
Other Technicians: Cláudio Macedo, Rodrigo Santos, Wilma Sobral, Wilcilaya Pontes, Rita Gonçalves
Colony Managers: Ana Vaz (Service Coordinator), Bruno Novais, Carlos Silva, Joshaba Abreu, João Pereira, Leonor Gomes, Erineo Silva

Glass Wash & Media Preparation Platform (GWMPP)

" Since March 2020, the GWMPP filled an instrumental role in the CCU COVID-19 Test Lab, by assisting with the complex daily logistics required for the viral and serological tests administered to patients and clinical staff.

In May, the CF and the Ministry of Labour, Solidarity and Social Security signed a protocol according to which the CF would provide diagnostic testing for several social entities in the country, while continuing in-house testing.

Under this protocol, a total of 1218 tests were requested for a total of 60 different social entities in the Lisbon District. These tests required that specific operations would be put in place so that each entity or municipal services could collect, conserve and deliver the respective sample collection kits safely and efficiently on a daily basis.

The kit preparation was done by the GWMPP Team in a tissue culture hood in sterile conditions. This process included safety protocols such as cutting and sealing the sterilisation sleeve and adding the virus inactivation solution to the tubes. To ensure the success of this operation, the team followed meticulous procedures of storage and organised records."

Cátia Feliciano

The Glass Wash & Media Preparation Platform supports investigators and laboratories at the CCU by providing clean and sterilised lab-ware such as glass, plastics and instruments, as well as preparing high quality tissue culture and bacteriological media required for standard research protocols.

Coordinator: Cátia Feliciano
Group Head: Maria José Vito
Technicians: Patrick Teca, Soraia Rodrigues, Madalena Martins

Histopathology Platform
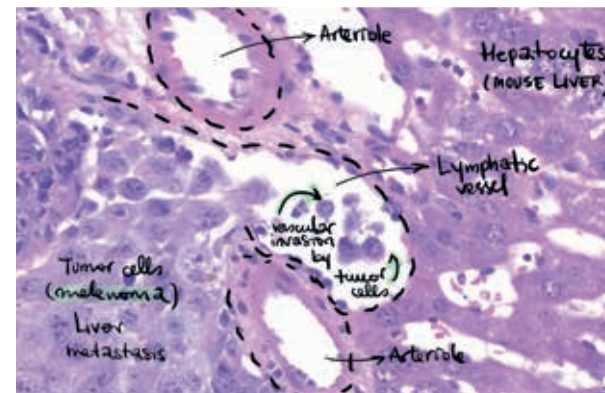
We transform fresh and fixed biological samples (cells, tissue biopsies, organs, whole organisms; from human, mouse, rat, fish, fly) into thin sections to be viewed under a microscope. And with specialised technicians and veterinary pathologists, we provide assistance in animal study design, including choice of fit-for-purpose animal/disease model/ procedure for the experimental question, and of the appropriate method for organ collection, fixation and analysis. We also provide necropsy training and support, gross and microscopic examination with written reports and images, and assistance in manuscript preparation & grant submission.

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

" 2020 was a game changer for the Histopathology Platform, for two main reasons.

Firstly, and forced by the pandemic, we saw our team of histotechnologists reveal themselves as incredibly versatile and resourceful individuals, as they stepped in to ensure the health and safety of our entire community, in the context of COVID-19 testing. Initially, Sérgio and Maria Inês joined the task force and MTTP to help with the molecular testing of patients and clinical staff. And more recently, Inês, Maria Inês, Sérgio and Susana were asked to step outside of their comfort zone and warrant routine sample collection for onsite testing on us all. Kudos to them!

Secondly, and concerning our core expertise, we added two new team members with skills that complement already existing ones: Joana is an RNAscope specialist, a powerful tool for localising gene expression in tissue samples and that can be combined with protein expression detection; and Tânia is an experimental pathologist, whose role is to collaborate and advise researchers in conduct design and planning, and perform gross and histopathological analysis with correlation to clinical and other experimental data. We look forward to seeing what happens next year!"

Tânia Carvalho

Software, Hardware and Flow Cytometry Platforms

> " In the beginning of 2020, the Hardware and Software Teams partnered-up to expand the range of languages and operating systems in which internally developed solutions can run on. This widened the user base while expediting implementation time.
>
> The Hardware platform was also working on cementing and improving a series of internal development standards, which work to expedite code recycling and development time. On top of that, we were also concluding a multi-year development cycle, in which a series intercompatible devices were created with the goal of expediting the creation and collection of behavioural stimuli and routines.
>
> With the arrival of the Sars-CoV-2 pandemic, the Software Platform switched gears, dedicating their time to two broad fronts: on one side to quickly shift the infrastructure in order to assist the scientific community with remote work, and on the other, supporting the focus4covid initiative.
>
> Focus4covid is a website in which medical professionals can make centralised requests for assistance to a local or national community of both amateur and professional builders, thereby cutting time between identifying needs and having them fulfilled.

The Hardware Platform designed and tested a cheap, easy to build ventilator to support the increasing need for these devices during the pandemic.

The Hardware Platform also adapted to support researchers and clinicians during the pandemic. First, it reorganised to keep the same level of assistance to the user base, while working remotely. It also contributed to the larger relief effort by designing and testing a cheap, easy to build ventilator as a last-resort solution for ailing patients."

Pedro Garcia da Silva

Scientific Hardware Platform

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.

Coordinator: Pedro Garcia da Silva
Platform Head and Hardware Developer: Filipe Carvalho
Hardware Developer: Artur Silva
Hardware Technician: Dário Bento
Mechanical Engineer: Paulo Carriço
Mechanical Technician: Filipe Mendes

Flow Cytometry Platform

The Flow Cytometry Platform is equipped with state of the art equipment to provide high quality service to the 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 2020, despite the pandemic situation, the platform expanded the cell separation hours by 20% (over 1200h) and kept the cell analysis hours (over 2000h).

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

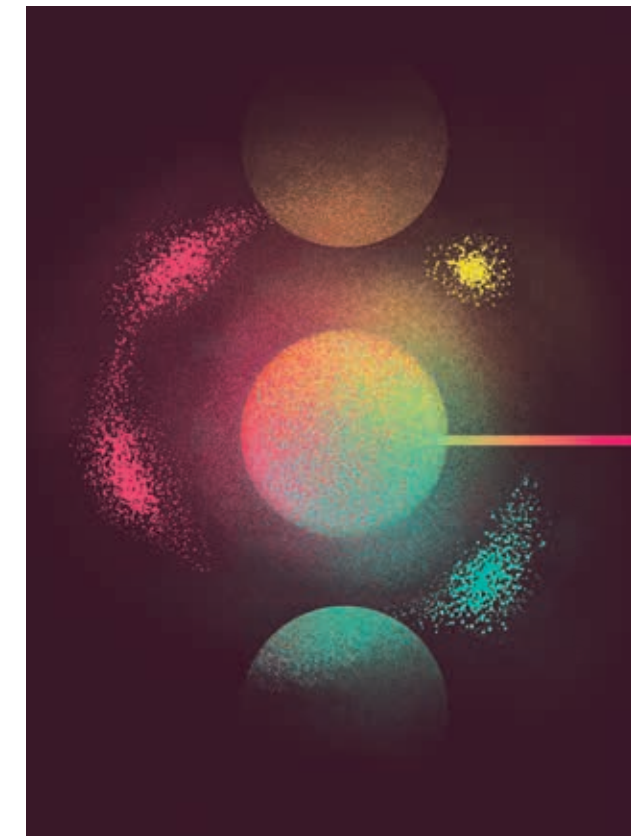## Scientific Software Platform

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.

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

Advanced BioImaging and BioOptics Experimental (ABBE) Platform

" Part of our role is to serve as a bridge between the CF and microscopy companies, not only regarding the maintenance, service, and troubleshooting of our imaging equipment, but also in order to envision, negotiate, establish and keep long-term partnerships.

In this regard, the efforts of the previous year have brought to the finalisation of a unique contract between CF and ZEISS. Sven Terclavers (ZEISS manager) and the ABBE Platform, with the full support of the CF Board of Directors, CR directors and Pedro Garcia da Silva, have conceived together a plan that has a partial homologue in Harvard, but that goes visionarily beyond.

The established partnership, called Evergreen programme, not only provides constantly updated technology in a flexible manner, fully serviced and supported, but also gives to the platform the possibility to have access to unique training programmes, travel support for courses or conferences, the possibility to test in advance and shape the new coming technology and to collaborate in the translational process that transforms prototypes developed in house into fully flexible commercial systems."

Davide Accardi

The Advanced BioImaging and BioOptics Experimental (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 identifying imaging strategies, providing detailed technical training in image processing, and guiding analysis.

The ABBE Platform is managed by an international team with a multidisciplinary background, from Bio-Engineering to Physics and brings together expertise from light-sheet microscopy to super-resolution imaging. The facility is therefore able to offer multi-scale capacity, imaging protein interactions to whole organisms.

Platform Head: Davide Accardi
Microscopist and Imaging Specialist: Anna Pezzarossa
Research Technician: Leonor Morgado
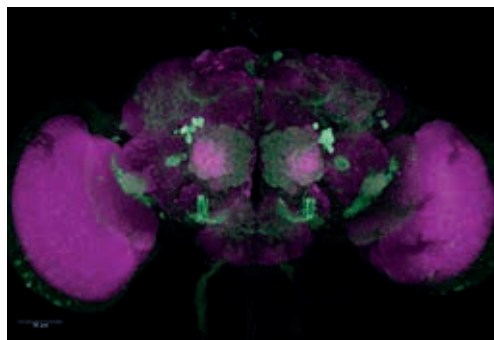
CR Support Units

The staff of the CR Support Units continued to support the CR community throughout the pandemic, successfully managing alternative work schedules, school closures, and the rapidly changing safety protocols. Each unit developed hybrid and remote work protocols to ensure that they could continue to provide the services needed by the CR community, in-person when required, and remotely whenever possible. A special thanks should be given to the team members who volunteered in the COVID-19 Test Lab and in COVID-19 Testing Registration, as well as to the Operations Coordinator who took a leading role in maintaining the safety of the community by managing COVID-19 safety procedures and protocols at CR.

Direction Support

" The Operations Manager was designated COVID-19 Operations Manager by the CR Direction Team. With this new role, Cátia assumed several responsibilities, including communicating COVID-19-related work policies to the CR Community and assessing compliance with health and safety practices at the CCU. This was achieved with continuous collaboration with the CCU's Hospital Infection Control Committee (HICC). This cooperation emphasized the importance of having strong bonds between the Clinic and the Research areas at the CCU.

The Operations Manager also supported the CCU COVID-19 Test Lab with equipment requests, the Health, Safety and Environment Standard Operating Procedures, and a Waste Management Programme.

To support the expansion of operations responsibilities it was critical to recruit additional support to manage emergency issues in the laboratories. Consequently, Artur Silva, a member of the Hardware Platform, volunteered his expertise in engineering and equipment issues to serve as additional support to the Operations unit.

As the year unfolded, it became clear that the CR community required close guidance from the Directors to navigate the ever-changing status of the pandemic. Consequently, the CR Direction Executive Assistant shifted her focus towards ensuring the Directors' communication channels to the community remained open and flexible, as the department swiftly adapted to new working conditions.

Snapshot from an instructional COVID-19 video produced by the Direction Support & CEO teams for the CR Community.

Frequent updates on the guidelines for safe and effective working conditions were needed, as well as working with the Directors on planning the future growth of the community."

Ryan Herbert

The Direction Support Team receives, delegates and implements direct instructions from the Research Direction Team and the Director of Research Support. This team also 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.

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

CF Pre-Award

" The Pre-Award team disseminated 300 funding opportunities; assisted the CCU research community with the preparation and submission of 216 research project applications, to more than 60 different funding entities; and supported the successful awarding of 35 projects."

Joana Lamego

Incepted in 2017, the CF Pre-Award team has developed, together with the CCU community, a unique framework for the provision of support to the securing of national and international funds for research. Grounded in four key pillars (Personal Tailoring, Coordination, Continuous Monitoring and Support), we assist our researchers throughout the first stages of the grant life cycle up to the award of the funding for their research endeavours.

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

Submission

Award

Preparation

Ideation

Funding Opportunities
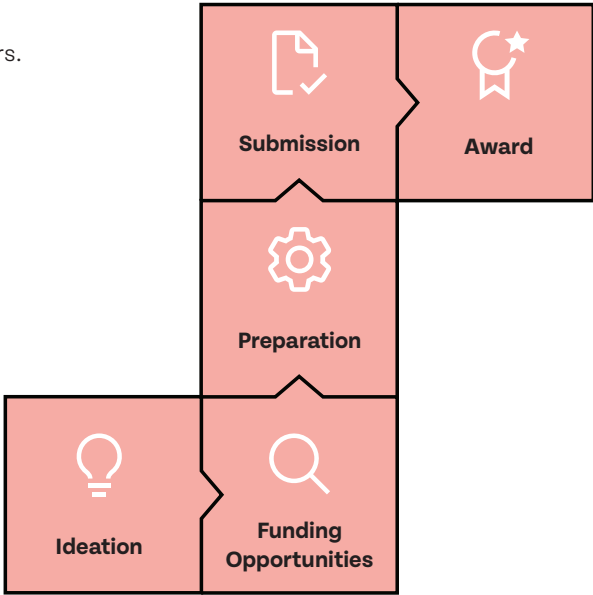
Communication Events & Outreach (CEO) Team

" Following a strategy designed in 2019, this team was restructured and expanded during the first months of 2020. In January, the CR's SciCom Team and CF's Communication Team became a single group that now serves the wider CCU community. As part of this plan, two new team members were hired – the Digital Content & Social Media Editor and the Junior Motion Graphic Artist & Video Editor, allowing the team to expand its range of expertise. The team's diverse set of goals and of initiatives targeting different publics, are accomplished by the collaborative efforts of this interdisciplinary team."

Catarina Ramos

The new CEO Team structure facilitated to the realisation of multiple initiatives during 2020, such as the Open Hearts Solidarity Campaign. During this campaign, the CCU community contributed a great number of items, including food and clothes, to several Portuguese charitable organisations.

The mission of the Communication, Events & Outreach (aka CEO!) team is to effectively and accurately communicate the scientific, clinical and institutional activity being carried out at the Champalimaud Centre for the Unknown. This team is responsible for maintaining fluent internal and external communication channels and strives to be at the forefront of communication, events organisation and outreach activities by combining classic methods with innovative and experimental approaches.

Coordinator (Science Communication, Education & Outreach): Catarina Ramos
Coordinator (Clinical and Institutional Communication & Events): Teresa Fernandes
Scientific Events Coordinator: António José Monteiro
Science Writer & Content Developer: Liad Hollender
English Teacher & Social Media Editor: John Lee
Senior Designer: Marta Correia
Junior Designer: Diogo Matias
Digital Content & Social Media Editor: Maria João Lourenço
Senior Multimedia Producer & AV Tech: Alexandre Azinheira
Junior Motion Graphic Artist & Video Editor: Tiago Coelho
Events Organiser: Ana Casaca
Project Manager (LaMAA): André Mendonça

Graduate Programme Office

The Graduate Programme Office operates the Teaching Lab and Classroom, which are the hubs of our PhD programme and all courses at Champalimaud Research. The team deals with the administrative and logistic aspects of the INPDP programme, the CAJAL courses, and other teaching events. The team also manages the CR library, the Teaching Lab space, and the Classroom bookings.

The office also assists with the student's social events, organises the INPDP recruiting process, and hosts the annual INPDP SAB visits. The Graduate Programme Office also became responsible for supporting applications to external PhD fellowship funding.

The Graduate Programme Office coordinates the academic accreditation and compliance of Champalimaud graduate programmes with our academic partners and the national accreditation agency, A3ES. Our PhD programme is an academic partnership with ITQB/ Universidade Nova de Lisboa and Instituto Superior de Psicologia Aplicada, which are the degree-granting institutions.

Coordinator: Thiago Carvalho
Managers: Maria Teresa Dias, Simone Zacarias (until September 2020)
Assistant Manager: Jorge Henriques (from October 2020)
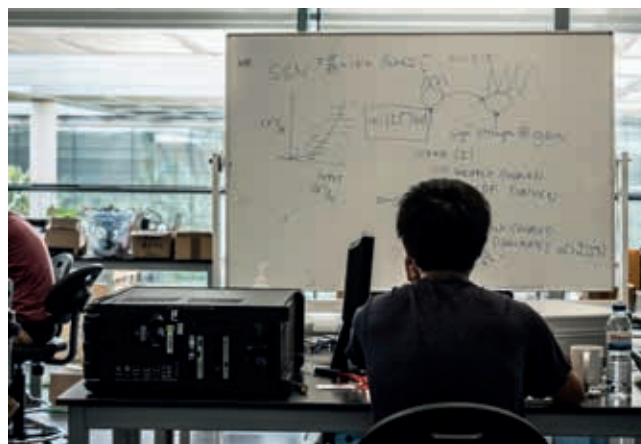
" With the attribution of the HR Excellence in Research Award, the Graduate Programme Office became involved in the planning of several actions of the HR Action Plan, namely in the curation of the Alumni Network; the implementation of a Synergised Skills Training Programme and the establishment of an External Pastoral Care/Mentoring Scheme.

Following its new role in supporting applications to external funding for students, the office has also helped secure eight PhD Fellowships in the 2020 FCT call."

Maria Teresa Dias

Health & Science

" From mapping brain circuits associated with mania, to augmented reality technology used for the first time to guide breast-cancer surgery with personalised breast models, and the confirmation of the "Watch-and-Wait" strategy as a possible replacement for surgery in more than 20% of rectal cancers – the team has brought CF's clinical and experimental research work to the attention of the general public."

Teresa Fernandes

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.

Coordinator (Clinical and Institutional Communication & Events): Teresa Fernandes
Health & Science Writer: Ana Gerschenfeld

HR & Fellows Support Office

" **The pandemic has shown the resiliency of remote work and has motivated us to improve and adapt our procedures. Special focus was placed on virtual onboarding processes and the smooth and successful articulation of the inter-teams processes and routines, from coffee breaks to payroll processing meetings. We are continually improving ways of remote assistance, of coordinating with public offices and digital bureaucratic affairs, as well as being as present as if in the office next door."**

Teresa Carona

CR has around 400 affiliated researchers and staff. This office aims to ease communication between CR and CF's central offices and services, and also to ensure that all commitments with the researchers are met.

We provide assistance with personnel affairs, from the recruiting stage to follow up after leaving the CCU. We are increasingly focused on the wellbeing of our researchers and co-workers not only with respect to work-related issues, but also with respect to various social issues.

Unit Head: Teresa Carona
Assistant: Pedro Alves

Lab Administration

" **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. We lost two experienced team members to attrition in the third trimester of the year, resulting in additional challenges and adaptations in order to continue to meet the needs of the growing CR community.**

Raquel Gonçalves

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

Unit Coordinator: Raquel Gonçalves
Laboratory Administrators: António Raposo, Margarida Nunes, Rita Saraiva, Telma Carrilho, Vesna Petojevic
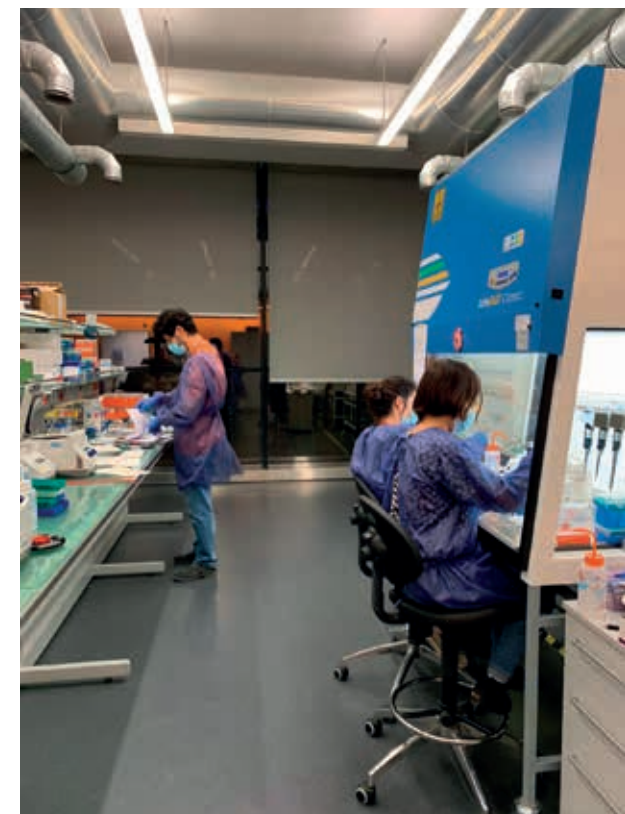
Three members of the Lab Admin Team (António Raposo, Margarida Nunes, Rita Saraiva) volunteering at the CCU COVID-19 Test Lab

Project Managers

QuantOCancer

"Beyond increased research capacity and network building, QuantOCancer project aims to develop institutional strategies towards equity, inclusion and diversity and engage a responsible research and innovation culture. In 2020, QuantOCancer project team:

Launched an online webinar and workshop series (Your Data, Your Story: showcase and share it right!) – bringing to the CCU (virtually) experts on open science, data management and transparency in publishing, exposing early-stage researchers to best practices.

Coordinated an application for the HR Excellence in Research Award (successfully awarded in October 2020).

Together with a group of proactive CCU volunteers, consulted with external discrimination and gender inequity expert Prof. Sabine Oertelt-Prigione to design preventative structures for a healthy working environment and, separately, a workshop on Sex and Gender Dimensions in Frontier Research.

In line with public engagement and science education aims, initiated a mentorship programme (Ciencia di Noz Manera) with a local Lisbon high school, connecting low-access underrepresented groups directly with active researchers."

Laura Ward

CONGENTO

"2020 marked the end of the first funding granted directly to the consortium formed by CF, CEDOC, IGC and iMM (through FCT and ERDF/Lisboa2020).

During 3 years, 3.5 M€ were used to endow the infrastructure with state-of-the-art equipment and highly specialised human resources, to the benefit of the national biomedical research community working with genetically tractable organisms. At CR, this was mainly translated into an increased capacity for hosting animals and generating new strains, as well as into a diversification of the services provided and training opportunities.

As an answer to the contingencies of the SARS-CoV-2 outbreak, remote training activities were developed – from webinars to video tutorials. Although being prepared since 2019, the launching of an online Laboratory Animal Science Theoretical Course (required to apply for a license to perform procedures in animals) was also an important contribution to keep science running during lockdown periods."

João Cruz

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.

EU Funded Projects (QuantOCancer): Laura Ward
Research Infrastructures (CONGENTO): João Cruz

Office for Sponsored Programmes – Post-Award

"OSP Post-Award embraced the new year of 2020 expecting new challenges and chances to grow. Each year prior, both the number of active projects and associated budget under the team's management and administration had consistently increased. We all knew 2020 would be no different. From learning to deal with a few funding agencies for the first time, to all the question marks around Horizon Europe, the 9th European Union Research & Innovation Investment Programme, the team anticipated plenty of novelty. Except for the unprecedented pandemic.

The disruption to our normal operating procedures created an opportunity to reevaluate those very same procedures while forcing us to adjust and adapt to the renowned limitations that came with each wave of lockdown. We learned to operate remotely, to communicate effectively from a distance, to work together despite often isolated. We benefited from fewer but more focused meetings, took advantage of increased time flexibility and much reduced commute times. We especially valued the increased quality of our internal and external interactions.

By December of 2020, OSP Post-Award had helped to manage 146 research projects and to submit nearly 100 financial and scientific reports. Record numbers only possible thanks to the such an outstanding community of researchers, support services, departments and inspiring leadership at CF."

Joaquim Teixeira

The Post-Award Team at the Office for Sponsored Programmes (OSP) provides support in management and administration of external funds for research, including financial and scientific reporting, eligibility of expenditure, compliance and external audits.

The Post-Award team also functions as a facilitator of the more bureaucratic aspects of grant management, thereby creating a bridge between the CR Scientific Community and the funding agencies. Post-award's support is also provided by a resident team of project officers from Verbochave, Consultoria Lda.

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

Publications

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Patents

Neurobiology of Action lab: US patent on novel BMI technology. (US10512410B2)

External Funding

The list below includes external competitive funds that were awarded during 2020, as well as external competitive funds that were awarded previously and were actively running at the CCU during 2020.

Institutional Projects

European Commission Horizon 2020

Human Brain Project Specific Grant Agreement 2
Coordination: EBRAINS
Call/Programme: H2020-SGA-FETFLAG-HBP-2017
Active period: 01/04/18-31/03/20

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

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)

CONGENTO - Consortium for Genetically Tractable Organisms
Call/Programme: 01/SAICT/2016
Active period: 01/06/17-31/05/20

PT2020 – BIOIMAGING-INFRAESTRUTURAS / PPBI - Portuguese Coordination: I3S Platform of BioImaging
Call/Programme: 01/SAICT/2016
Active period: 01/06/17-31/05/20

Biodata.pt Portuguese Biological Data Network
Coordination: Instituto Gulbenkian de Ciência
Call/Programme: 01/SAICT/2016
Active period: 19/06/17-17/06/20

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: 01/01/19-31/12/20

Allen Institute

Cindy Poo
Selected for the Next Generation Leaders Council at the Allen Institute

BIAL Foundation

Rita Fior
BIAL Clinical Medicine Prize – Honorable Mention

Buck Institute

Zita Santos & Carlos Ribeiro
Selected as Inaugural Scholars of the Global Consortium for Reproductive Longevity and Equality

FCT/L'Oreal Portugal

Cristina Godinho-Silva (Veiga-Fernandes lab)
Circadian neuroimmune regulation of kidney physiology
L'Oréal Portugal Medals of Honor for Women in Science 2019

Federation of European Neuroscience Societies (FENS)

Carlos Ribeiro
Elected FENS Secretary-General for the mandate of 2022-2024

Fundação AstraZeneca

Cátia Rebelo (Castillo-Martin lab)
Innovative Competition of the iMed Conference (Category of Translational Research) - Finalist
Do MHC Class I Negative Tumour Cells Display the Cancer Stem Cell Property of Chemoresistance? Unravelling the Mechanisms

Fundação AstraZeneca & Sociedade Portuguesa de Oncologia

Mireia Castillo-Martin
Prémio FAZ Ciência - Honorable Mention for the project "Expansion of Natural Killer cells as a complementary approach for adoptive cell therapy in advanced Colorectal and Pancreatic Cancer (NKAT-CRC-PDAC)"

International Society of Cancer Imaging

Nickolas Papanikolaou
Elected as a fellow of the International Society of Cancer Imaging

National Academy of Medicine (USA)

Rui Costa
Elected as a member of the National Academy of Medicine (USA)

NOVA Medical School

Carolina Pestana (João lab)
Innovate Competition, prize for the project: "Statistical methods for the study of extracellular vesicles' content and their potential as biomarkers of multiple myeloma aggressiveness".

Pfizer

Henrique Veiga-Fernandes (Veiga-Fernandes lab)
Pfizer/SCML: Prémios de Investigação Clínica e Investigação Básica)

Roche Neuroscience Innovation Program

Romain Ligneul (Mainen lab) and Daniela Domingues (Paton lab)
The Neuro-Headset project won the 3rd place award in the Building Tomorrow Together Contest

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

Brain and Behavior Research Foundation

Romain Ligneul (Mainen lab)
From Neuronal Firing to Behavior: Breaking Down the 5-HT Chain Events
Call/Programme: 2017 NARSAD Young Investigator Grant
Active period: 15/01/18-14/01/20

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: 15/07/19-14/07/21

Breast Cancer Now

Bruno Costa-Silva
Bosutinib effects in pre-metastatic niche formation and lung mestastasis in breast cancer
Call/Programme: Catalyst Programme
Active period: 04/06/18-03/06/21

Buck Institute for Research on Aging

Zita Santos & Carlos Ribeiro
Metabolic reprogramming, dietary nutrients and food cravings in ovary aging
Active period: 01/08/20-31/07/22

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

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: 01/08/20-31/07/22

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 Technologias Kai Erevnas – Foundation for Research and Techology 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: 01/10/20-30/09/24

Gonzalo de Polavieja
Coordination Proyetos Y Sistemas de Mantenimiento SL – EPROSIMA EPROS
ALMA: Human Centric Algebraic Machine Learning' – 'ALMA'
Call/Programme: H2020-EIC-FETPROACT-2019
Active period: 01/9/20-31/8/24

Megan Carey
Cerebellar circuit mechanisms of coordinated locomotion in mice – LOCOMOUSE
Call/Programme: ERC-2014-STG
Active period: 01/05/15-30/04/20

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: 01/11/17-31/10/22

Rui Costa
Behaviour Phenotyping using Inertial Sensors (WEAR)
Call/Programme: ERC-2018-POC
Active period: 01/01/19-30/06/20

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: 01/01/18-31/12/21

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

Zachary Mainen
Modulation of cortical circuits and predictive neural coding by serotonin – 5HTCircuits
Call/Programme: ERC-2014-ADG
Active period: 01/01/16-31/12/20

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 Sairaanhoitopiirin Kuntayhtymä (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: 01/11/17-31/10/21

Albino Oliveira-Maia (Coordinated by: Waterford Institute of Technology (WIT))
A Federated Artificial Intelligence solution for moniToring mental Health status after cancer treatment
Call/Programme: H2020-SC1-DTH-2019
Active period: 01/01/20-31/12/22

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: 01/03/16-28/02/21

Henrique Veiga-Fernandes
Glia-derived factors in innate lymphoid cell sensing and intestinal defence
Call/Programme: ERC-2014-CoG
Active period: 01/06/17-30/06/20

European Commission FP7-Seventh Framework Programme

Eduardo Moreno
Active Mechanisms of Cell Selection: From Cell Competition to Cell Fitness
Call/Programme: ERC-2013-CoG
Active period: 01/09/16-31/05/20

European Commission - Marie Skłodowska-Curie Actions

David Brea López (Veiga-Fernandes lab)
Neural regulation of the immune system in the gut
Call/Programme: H2020-MSCA-IF-2018
Active period: 01/09/20-31/08/22

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

Andrada Ianus (Shemesh lab)
MRI based mapping of microscopic brain composition in a mouse model of Alzheimer's Disease – uImaging'
Call/Programme: H2020-WF-2018-2020 / H2020-WF-02-2019
Active period: 01/05/20-29/09/20

European Molecular Biology Organization (EMBO)

Bruno Costa-Silva
Call/Programme: EMBO Installation Grants
Active period: 01/06/18-31/05/21

Fundação Bial

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: 02/01/19-31/12/20

Joe Paton
How do dopamine neurons and striatal populations interact during decision-making?
Call/Programme: Grants 2016/2017
Active period: 17/07/17-17/07/20

Fundação para a Ciência e a Tecnologia

Megan Carey
The nature of error signals during locomotor learning
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/21

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

Bruno Costa-Silva (Coordinated by: 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 (Coordinated by: 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: 01/10/18-30/09/21

Bruno Costa-Silva (Coordinated by: Rune Matthiessen, Univ. 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: 01/10/18-30/09/21

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: 01/06/18-31/05/21

Eran Lottem (Mainen lab)
Serotonergic Control of Decision-Making and Impulsivity
Call/Programme: 02/SAICT/2017
Active period: 01/09/18-31/08/21

Cindy Poo (Mainen lab)
Odors and memory: neural mechanisms for encoding contextual information in olfactory cortex
Call/Programme: 02/SAICT/2017
Active period: 01/10/18-30/09/21

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: 03/10/18-02/10/21

Albino Oliveira-Maia (Co-PI: Zachary Mainen)
Cognitive flexibility, cortical excitability and antidepressive effect of psilocybin
Call/Programme: 02/SAICT/2017
Active period: 03/10/18-02/10/21

Luzia Travado (Oliveira-Maia lab)
Distress and regional brain metabolism: a correlational study in metastatic breast cancer patients
Call/Programme: ICDT 2014
Active period: 01/06/16-31/01/20

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: 01/06/18-31/05/21

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: 01/08/18-31/07/21

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, Instituto Gulbenkian de Ciência)
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: 17/07/18-16/07/21

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: 01/10/18-30/09/21

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: 01/08/18-31/07/21

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: 2018-2021

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: 01/07/18-30/06/21

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: 14/06/18-13/06/21

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: 01/10/18-30/09/21

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: 01/10/18-30/09/21

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: 01/07/20-30/06/20

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: 2017-2021

"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 (Coordinated by: Arkaitz Carracedo, Asociación Centro de Investigatión en Biociencias)
Eradicating prostate cancer metastasis before clinical manifestation (HiddenMETS)
Call/Programme: la Caixa Health Research 2017 Call
Active period: 01/09/19-31/08/21

Bruno Costa-Silva (Coordinated by: 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: 15/09/19-14/09/22

Leopoldo Petreanu
Optical dissection of cortical circuits for sensory expectations
Call/Programme: Health Research 2017 Call
Active period: 01/12/18-30/11/21

Carlos Ribeiro
Identifying and testing the metabolites generated by two psychoactive gut bacteria to alter brain function and behavior
Call/Programme: Health Research 2017 Call
Active period: 2018-2021

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: 01/10/20-30/9/22

Paul G. Allen Family Foundation

Henrique Veiga-Fernandes
Deciphering peripheral neuroimmune architecture by intercellular labelling
Call/Programme: Allen Distinguished Investigators Program
Active period: 15/12/18-01/12/21

Portugal 2020

Durval Costa (Coordinated by: 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

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: 01/07/17-30/06/22

Zachary Mainen (Coordinated by: Anne Churchland, Cold Spring Harbor Laboratory)
International Brain Laboratory (IBL)
Call/Programme: Life Sciences – Simons Collaboration on the Global Brain Research Award
Active period: 01/07/17-30/06/22

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

Union for International Cancer Control

Luzia Travado (Oliveira-Maia lab)
Validation of CALM psychosocial therapy in MBC patients in Portugal
Call/Programme: UICC – SPARC – Metastatic Breast Cancer Challenge – 2017 Call
Active period: 01/01/18-31/12/20

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: 10º Prémio Crioestaminal 2017
Active period: 01/01/19-31/12/20

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 (Rui Costa lab)
Neurobiology of social cognition
Call/Programme: ERASMUS MC
Active period: 01/10/14-31/05/20

European Commission – Marie Skłodowska-Curie Actions

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: 01/10/19-30/09/21

Davide Reato (Renart lab)
Functional role of neuronal spontaneous activity for sensory processing
Call/Programme: H2020-MSCA-IF-2016
Active period: 01/09/18-31/08/20

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

Henrique Veiga-Fernandes
Tracing of pulmonary neuro-immune networks
Call/Programme: H2020-MSCA-IF-2017
Active period: 14/03/18-13/03/20

David Brea López (Veiga-Fernandes lab)
Neural regulation of the immune system in the gut
Call/Programme: H2020-MSCA-IF-2018
Active period: 01/09/20-31/08/22

João Marques (Chiappe lab)
Understanding how self-movement representations shape motor learning – FlyLearn'
Call/Programme: H2020-MSCA-IF-2019
Active period: 01/6/20-31/5/22

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: 01/11/20-31/01/22

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: 2019-2021 (Awarded 2019)

María Martínez-López (Veiga-Fernandes lab)
Commensal microbiota regulation of neuro-immune networks
Call/Programme: H2020-WF-01-2018
Active period: 01/11/20-31/01/22

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

Roksana Pirzgalska (Veiga-Fernandes lab)
Neuroimmune control of the intestinal mucosa: from nutrient absorption to immune responses
Call/Programme: CEEC Individual 2018
Active period: 01/8/20-31/7/26

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: 09/7/20-09/5/21

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 (R Costa lab)
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

Mayra 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

Dario 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: 2019 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

Mariana Batista Santos (Rhiner lab)
Signatures of damage-responsive neural stem cells
Call/Programme: 2015 PhD Fellowships
Active period (at CF): 04/02/19-31/01/20

Rita Figuereido (Ribeiro lab)
The effects of tumorigenesis on nutrient cravings: dissecting the role of cellular metabolism in directing specific nutritional appetites to sustain high cell proliferation rates
Call/Programme: 2019 PhD Fellowships
Active period: 2020-2024

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

Gilead Sciences

Cristina João
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 GÊNESE 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: 01/07/18-31/05/20

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

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

Adrien Jouary (Orger lab)
The latent dynamic underlying visually driven behavior
Call/Programme: Postdoctoral Junior Leader Fellowships
Active period: 01/9/20-31/8/23

Esha Madan (Cell Fitness lab)
Study of Deptor-mir181d axis in human breast cancer
Call/Programme: Postdoctoral Junior Leader Fellowships
Active period: 01/9/20-31/8/23

Roel Wolterink (Veiga-Fernandes lab)
Deciphering the architecture and language of pulmonary neuroimmune communication
Call/Programme: Postdoctoral Junior Leader Fellowships
Active period: 01/9/20-31/8/23

Andrada Ianus (Shemesh lab)
MRI based mapping of microscopic brain composition in Alzheimer's disease
Call/Programme: Postdoctoral Junior Leader Fellowships
Active period: 01/9/20-31/8/23

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

Sociedade Portuguesa de Hematologia

Bruna Velosa Ferreira (João lab)
O papel do micro-ambiente metastático no Mieloma Múltiplo extramedular
Call/Programme: Bolsas de Iniciação à Investigação
Active period: 05/06/18-04/06/20

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: 01/01/19-31/12/20

Education Projects

BPI & "la Caixa" Foundation

Coordinator: Catarina Ramos (Project coordinator: TreeTree2)
Aprender a Aprender: Laboratório de Metacognição, Neurociência e Machine Learning
Call/Programme: Prémio BPI "la Caixa" Infância
Active period: 01/09/19-31/08/20

Câmara Municipal de Lisboa

Coordinator: Catarina Ramos in collaboration with TreeTree2
O LaMAA vai à Escola
Call/Programme: BIP/ZIP
Active period: 30/09/20-31/10/21

Fundação Calouste Gulbenkian

Coordinator: Catarina Ramos
Neuronautas: Novos exploradores do cérebro
Call/Programme: Academias Gulbenkian do Conhecimento
Active period: 19/10/18-18/10/22

Theses

PhD Theses

January 16
Nuno Loureiro
Operant EEG-based BMI: Learning and consolidating device control with brain activity
Thesis Advisors: Rui Costa (CR & Columbia University) and José del R. Millán (University of Texas)

January 27
Inês Ferreira
Extracellular vesicles: agents of gut communication in prediabetes scenario
Thesis Advisors: Bruno Costa-Silva (CR) & Paula Macedo (Universidade NOVA de Lisboa)

February 4
Roberto Medina
Optimal Decision Making for Temporally Extended Actions
Thesis Advisor: Alfonso Renart (CR)

February 13
Madalena Fonseca
Serotonin, impulsive behaviour, and brain-wide networks
Thesis Advisors: Zachary Mainen & Noam Shemesh (Both CR)

June 25
Rita Félix
Sensory and motor representations in the inferior olive of larval zebrafish
Thesis Advisors: Michael Orger & Megan Carey (Both CR)

September 5
Pietro Vertechi
Latent variable decoding in biological and artificial agents: Towards a unified approach
Thesis Advisor: Zachary Mainen (CR)

September 21
Pedro Rodrigues
Knowledge versus experience – Exploring model-based and model-free reinforcement learning in obsessive-compulsive disorder
Thesis Advisor: Albino Oliveira-Maia (CR)

December 17
Danbee Kim (External INDP Student)
On the aims and methods of Field Neuroscience: Non-invasive techniques for studying nervous systems in natural settings
Thesis Advisor: Adam Kampff (The Sainsbury Wellcome Centre, UCL)

MSc Theses

April 29
Daniel Silva
Cortical excitability and its modulation, in vivo, using Transcranial Magnetic Stimulation
Thesis Advisors: Albino Oliveira-Maia (CCU) & Frederico Simões do Couto (Instituto de Medicina Molecular)

October 2
Sofia Silva
pERK as a neuronal activity marker in Drosophila melanogaster
Thesis Advisors: Marta Moita & Isabel Campos (CR)

November 6
Ildefonso Ferreira Pica
Inferring causality in synchronized chaotic systems using convergent cross mapping
Thesis Advisor: Alfonso Renart (CR)

December 17
Beatriz Moura
Cell-type specificity of cortico-cortical connections between the visual and retrosplenial cortices of the mouse
Thesis Advisor: Leopoldo Petreanu (CR)