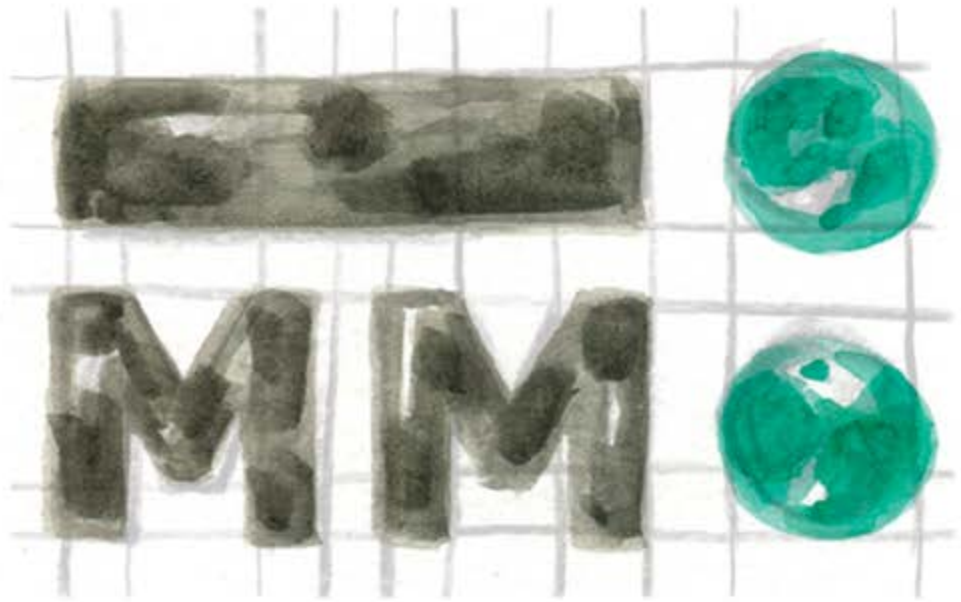




Instituto
de Medicina
Molecular

João
Lobo
Antunes



Highlights

2022

iMM

Instituto de Medicina Molecular João Lobo Antunes

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March 2023

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Instituto
de Medicina
Molecular

João Lobo
Antunes

A word from the board

by Maria Manuel Mota
& Bruno Silva-Santos

Over the past years, the iMM has become a place where researchers and research supporters, clinicians, and students from all over the world feel welcome and at home. Together, we have created a culture of excellence, innovation, rigor and collaboration that has helped us tackle some of the major challenges in life sciences, health and disease.

We are thrilled to report that 2022 was a remarkable year for the iMM community. Following a couple of gloomy (due to COVID-19) years, 2022 was met with great enthusiasm by iMMers. Labs were bustling once again, masks were removed, social interactions resumed, the cafeteria (re)opened its doors... and above all, science thrived as many discoveries were made.

Among some of the advances highlighted ahead, Sérgio de Almeida's team identified a new mechanism that regulates gene expression in cells, crucial for defining a cell's type and function. Luísa Figueiredo's group made a groundbreaking discovery on mRNA stability, with implications for RNA-based prophylactic and therapeutic strategies. And Cláudia Faria and colleagues created a library of tumor brain metastases models that mimic the disease in humans, providing new approaches for drug discovery and therapeutics.

We also enjoyed time together again. The year was certainly marked by an amazing retreat that joined 320 iMMers and our Scientific Advisory Board at Costa da Caparica to celebrate our science and discoveries. Moreover, the 2nd COLife Community Meeting took place at Forte S. Julião da Barra in Oeiras and, in a stimulating environment, 260 members of 5 distinct research institutions in the Lisbon-Oeiras area showed being eager to share experiences and know-how.



As we must also prepare for future discoveries, one of the most notable achievements of 2022 was the success of our group leaders Luís Graça and Cláudio Franco in securing “la Caixa” Health Research grants. These bring up to 11 the total number of such grants based at iMM, a testament to our research’s quality and impact. We are also delighted that João Barata and senior postdoc Ana Rita Fragoso received a Proof of Concept Grant from the European Research Council to explore the potential of a microRNA-based targeted therapy for cancer.

In addition to these external funding successes, we were delighted to reintroduce our intramural scheme, “BIG – Breakthrough Idea Grant”, which awarded institutional funds to 3 projects, led by Sérgio de Almeida and Edgar Gomes; Leonor Saúde; and Luísa Figueiredo and Claus M. Azzalin.

These projects exemplify the innovative and collaborative spirit of the iMM community and have the potential to make a real impact on human health.

In 2022 we also celebrated the work of our trainees at all levels. We were thrilled to present the annual awards for the best Master and PhD theses, and also – for the first time – a new award directed at postdoctoral fellows. These awards are a tribute to the dedication and hard work of our trainees and their mentors, and we are delighted to support the next generation of scientific leaders. We have also been preparing to establish and be in much closer contact with our alumni. Thus, in 2022 we officially founded the iMM Alumni Community, spread across 25 countries on all five continents, to provide valuable inputs and feedback on the impact of our programs and to promote international networking.

And we could not have finished the year in a better way: in December we received the news of our “Teaming” proposal being approved by the European Commission! This ambitious project will allow us to implement the full vision we have for iMM, in collaboration with our key partners at the Vall d’Hebron Institute of Research (VHIR). Our goal for iMM-CARE is to achieve excellence in clinical and translational research with a mission-driven, human-centred, data-driven research and innovation (R&I) model as a new way to engage all stakeholders – citizens, patients, healthcare professionals, scientists, entrepreneurs, industry, health authorities and government – in interdisciplinary, cross-sectoral collaborations to solve pressing health challenges. And these news came just in time to be celebrated in a wonderful Christmas (or whatever you want to call it) party, which once again took place at “Ferroviário”, and provided many unforgettable moments like the winning video of the now traditional challenge ;)

As we look ahead into 2023 and beyond, we are confident that iMM will continue to be a vibrant and dynamic home for research excellence, innovation, and collaboration. We are excited to see what the future holds for our community, and we look forward to welcoming new members to our scientific family.

Thank you for your continued support, dedication, and enthusiasm for the iMM!

Organization & Structure

The mission of the Instituto de Medicina Molecular João Lobo Antunes (iMM) is to foster basic, clinical and translational biomedical research with the aim of contributing to a better understanding of disease mechanisms, developing novel predictive tests, improving diagnostics tools and developing new therapeutic approaches.

Created in December 2002, iMM is located on the campus of the Faculdade de Medicina da Universidade de Lisboa (FMUL) and Centro Hospitalar Universitário Lisboa Norte (CHULN), and together constitute an innovative academic center, Centro Académico de Medicina de Lisboa (CAML). iMM is mainly supported by national public funds and European Union funds. The research expenditure includes funds obtained from peer-reviewed competitive grants, private donations and institutional partnerships.

iMM Associated Members

- Universidade de Lisboa
- Faculdade de Medicina da Universidade de Lisboa
- Centro Hospitalar Universitário Lisboa Norte – Hospital de Santa Maria
- Associação para a Investigação e o Desenvolvimento da Faculdade de Medicina
- Fundação Oriente

Board of Trustees

The Board of Trustees is composed of representatives of the Associated Members and meets at least once per year to analyze the scientific and financial report and to approve the plan of activities and budget for the next year.

Board of Directors

The Board of Directors is responsible for the management of the Institute according to the plans approved by the Trustees. The Board of Directors is elected by the Trustees.

Maria Carmo-Fonseca
MD, PhD - President

Maria Manuel Mota
PhD - Executive Director

Bruno Silva-Santos
PhD - Vice-Director

Finance and Operations Director
Fausto Lopo de Carvalho

Scientific Advisory Board

The Scientific Advisory Board undertakes periodic evaluations of the iMM specific programs and includes international experts of scientific fields.

Carlos Caldas
MD, PhD - Chairman
Cancer Research UK Cambridge Institute
Cambridge Cancer Center UK

Caetano Reis e Sousa
PhD - Francis Crick Institute, London, UK

Elaine Mardis
PhD - Institute for Genomic Medicine at
NationWide Children's Hospital, USA

Yasmine Belkaid
PhD - National Institutes of Health, USA

Industry Advisory Board

The Industry Advisory Board provides assistance to the Technology Transfer Office team in the definition of a strategy and action plan to drive innovation at iMM.

Daniela Couto
Biogeneration Ventures Fund

David Malta
Vesalius Biocapital

Isabel Ferreira
Versameb

Miguel Forte
Zelluna Immunotherapy

Pascale Redig
Janssen

Societal Advisory Board

António Barreto
Chairman
Sociologist and Columnist

Graça Franco
Renascença Group

Paula Martinho da Silva
Lawyer

Diogo Lucena
NOVA School of Business and Economics

João Filipe Queiró
Faculdade de Ciências e Tecnologia
da Universidade de Coimbra

Henrique Leitão
Faculdade de Ciências da Universidade
de Lisboa

Pedro Norton
Finerge

Domitília dos Santos
The dos Santos Group

Board of Directors:

Maria Carmo-Fonseca
(President)

Maria Manuel Mota
(Executive Director)

Bruno Silva-Santos
(Vice-Director)

Secretary of the President
Patricia Cúcio

Assistant to the Board of Directors
Clara Artur

Quality Management Office
Alexandre Jesus

Scientific Advisory Board
Industry Advisory Board
Societal Advisory Board

Research Labs:

Ana Espada de Sousa Lab
Ana Sebastião Lab
Bruno Silva-Santos Lab
Cláudio Franco Lab
Claus M. Azzalin Lab
Edgar Gomes Lab
Gonçalo Bernardes Lab
Joana Neves Lab
João Barata Lab
João Eurico Fonseca Lab
João Lacerda Lab
Joaquim Ferreira Lab
Leonor Saúde Lab
Luís Costa Lab
Luís Graça Lab
Luísa Figueiredo Lab

Luísa Lopes Lab
Mamede de Carvalho Lab
Marc Veldhoen Lab
Maria Carmo-Fonseca Lab
Maria Mota Lab
Mário Ramirez Lab
Miguel Castanho Lab
Miguel Prudêncio Lab
Miguel Remondes Lab
Nuno Morais Lab
Nuno Santos Lab
Paulo Filipe Lab
Pedro Sousa-Victor Lab
Sérgio de Almeida Lab
Sérgio Dias Lab
Vanessa Morais Lab

Finance & Operations Office:

Fausto Lopo de Carvalho
Finance and Operations Director

Project Management
Madalena Reis

Accounting
Sandra Duarte

Purchasing and Procurement
Alexandre Jesus

Legal & Human Resources
Inês Bilé

Safety and Compliance
Sara Santos

Molecular Diagnostic Unit
Patrícia Napoleão

Biobank Unit
Sérgio Dias / Cláudia Faria

Communication Office
Inês Domingues

Flow Cytometry Unit
Mariana Fernandes

Pre-Award
Joana Costa

Technology Transfer Office
Pedro Silva

Zebrafish Unit
Leonor Saúde

Training Hub
Claus M. Azzalin

Analytical and Structural Biochemistry Unit
Francisco J. Enguita

Bioimaging Unit
José Rino

Comparative Pathology Unit
Luísa Figueiredo (Commissioner)

Information Systems Unit
Daniel Silva (Started in August)

Rodents Unit
Iolanda Moreira

Facilities:

People

531

RESEARCHERS

86

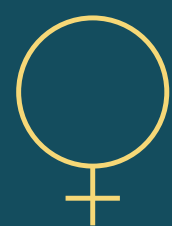
TECHNICAL STAFF

60

ADMINISTRATIVE STAFF

677

TOTAL



Female
456



Male
221

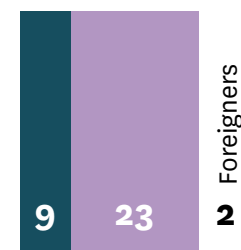


Nationalities
24

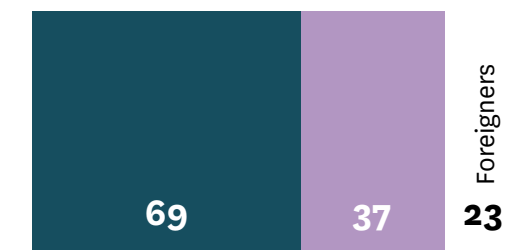


Research
Groups
32

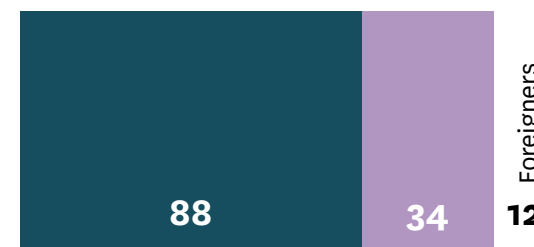
Group Leaders
Total 32



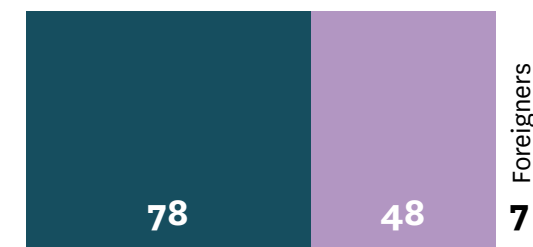
Postdocs
Total 106



PhD Students
Total 122



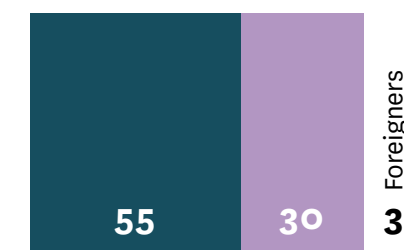
Master Students
Total 126



Trainees
Total 22

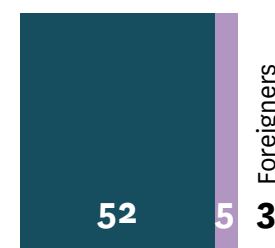


Clinical Researchers
Total 85



Female
Male

Lab Technicians, Lab Managers,
Administrative Technicians,
Project Managers
Total 57



Research Areas
Total 9

Molecular and Cellular Biology
Host and Microbe
Chemical Biology and Biophysics
Clinical Sciences
Development and Aging
Neurosciences and Behaviour
Oncobiology
Systems Physiology
Immunology and Inflammation

Productivity at a Glance

364

Communications
in International
Conferences

233

Communications
in National
Conferences

294

Invited Lectures
and Seminars

88

Organization
of Conferences

170

Prizes
and Honours

21

PhD Theses
Completed

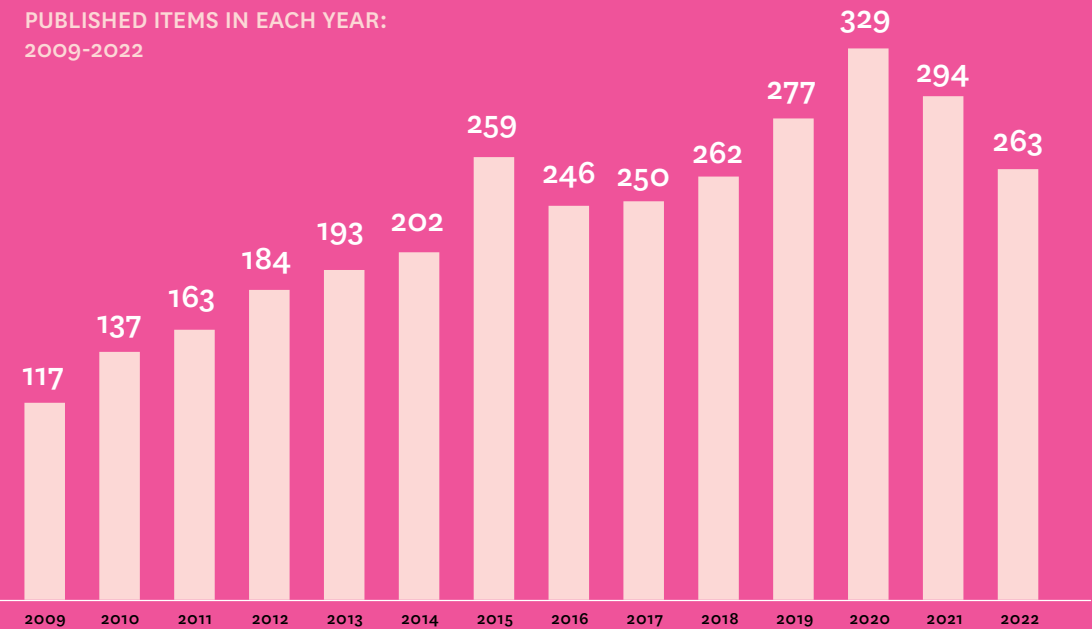
61

Master Theses
Completed

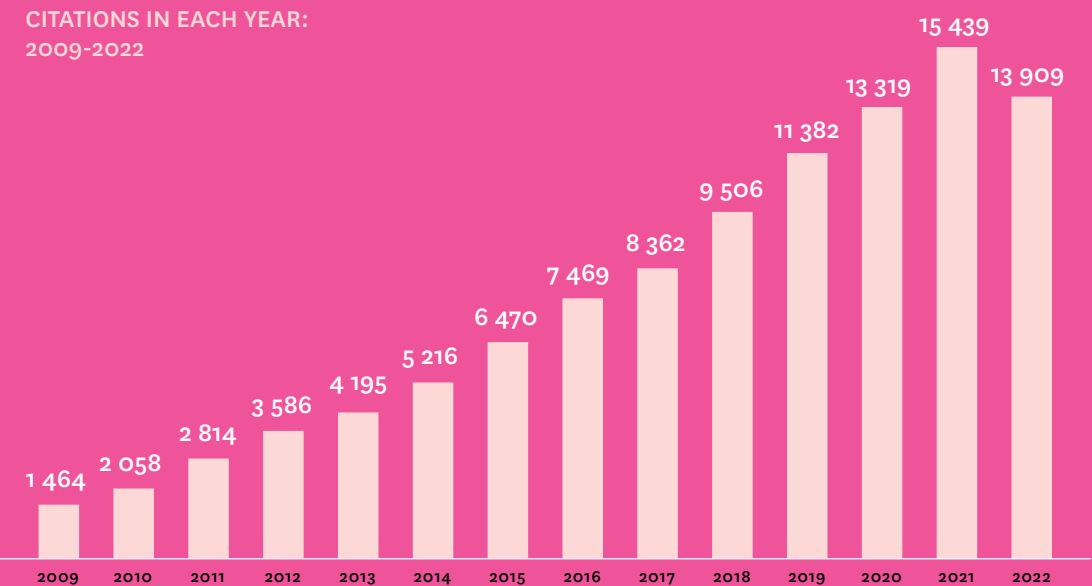
iMM Publications in International Journals

(Source: Web of Science™)

PUBLISHED ITEMS IN EACH YEAR:
2009-2022



CITATIONS IN EACH YEAR:
2009-2022



263
Papers
in 2022

90 548
Sum of the
times cited

28.47
Average citations
per item

120
H-index

Note: This data is based on the information available on the Web of Science, hence, it is not an exhaustive analysis of the iMM publications.

Number of ongoing research grants in 2022

198

Total Research Grants

74

Public National FCT

2

Public National Other

33

Public European Commission

1

Public International Other

26

Private National

11

of which with the industry

62

Private International

34

of which with the industry

Number of research funding grants initiated in 2022

50

Total Research Grants

26

Public National

6

Public International

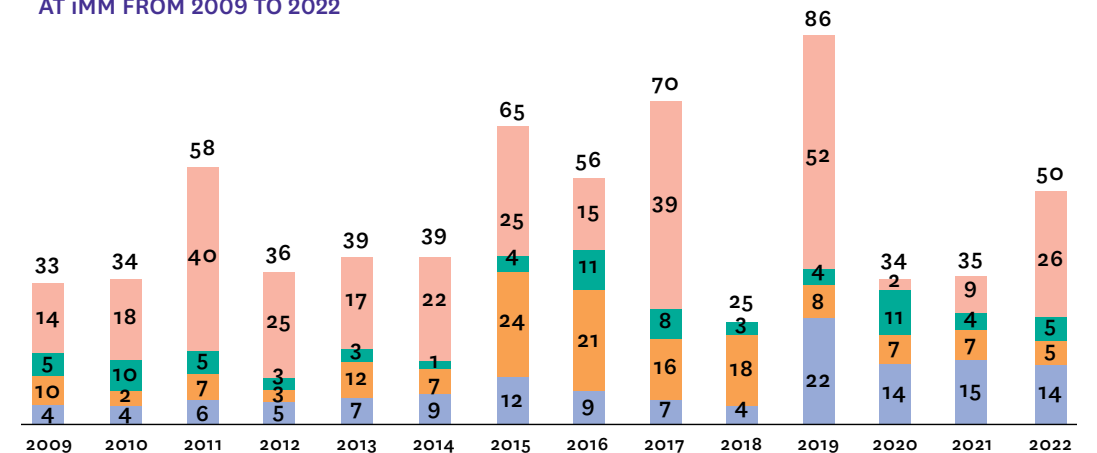
7

Private National

11

Private International

NUMBER OF RESEARCH GRANTS INITIATED AT IMM FROM 2009 TO 2022



Innovation:

29

New Inventions

8

License Agreements

42

Patents Filings

238

Industry Collaborations

2022, a year in review

JANUARY

- 1 **2022 Blavatnik Awards for Young Scientists** based in the United Kingdom
Gonçalo Bernardes (Group Leader)
- 2 **Pfizer Global Medical Grant**
Sandra Casimiro, Luís Costa Lab and Luís Costa (Group Leader)

MARCH

- 5 **EMBO's Catalysts program researchers' panel**
Cláudio Franco (Group Leader)
- 1st **COLife Hackaton: Future Food Challenge**

MAY

- 7 **Blending Art and Biomedical Sciences Blend launch** by Marta de Menezes & Luís Graça (Group Leader)
- 8 **XV CAML & V NeurULisboa PhD Students Meeting**
- 9 **Terry Fox Grant**
Diogo Silva, João Lacerda Lab

JUNE

- Breakthrough Idea Grant 2022 Awards**
(11A) Sérgio de Almeida & (11B) Edgar Gomes (1st prize)
(11C) Leonor Saúde and (11D) Luísa Figueiredo & (11E) Claus M. Azzalin (2nd prizes ex aequo) (Group Leaders)
- Modelling Biological Data: the Second RiboMed Summer School**
- Out of Our Box SciDoArmário: Visibility of LGBTIQ people in Portuguese STEM**
Nuno Gonçalves
- Master Students Day**
- iMM Scientific Retreat 2022**



20

iMM Highlights 2022

Start of the 2022 **LisbonBioMed International PhD program**

- 3 **ERC Proof of Concept Grant**
Rita Fragoso, João Barata Lab
- 4 **ISN Career Development Grant**
Sandra Vaz, Ana Sebastião Lab

Out of Our Box INSTRMNTS - Resonant Containers of Meanings
Victor Gama

FEBRUARY

IRS Consignation campaign for the iMM-Laço Hub

- 6 **iMM Best Master Thesis Awards 2020/2021**
(6A) Rita Silva, Nuno Morais Lab
(6B) Leonor Lameira, Leonor Saúde Lab & Daniela Abreu, Ana Sebastião Lab

Out of Our Box Science, Logic and Human Reasoning
Desidério Murchio

APRIL

MAY

- 10 **Marie Skłodowska-Curie Actions and Citizens Grant RAISE (iMM, Champalimaud Foundation, Native Scientists & ImpactEd consortium)**
- 2021 Scientific Prize by Universidade de Lisboa/Caixa Geral de Depósitos**
Bruno Silva-Santos (Group Leader)
Edgar Gomes (Group Leader)

- 12 **Lidia Silva Santos Postdoctoral Achievement Award**
Sara Silva Pereira, Luísa Figueiredo Lab
Rita Cascão, João Barata Lab
Isaura Martins, Leonor Saúde Lab

- 13 **2021 João Lobo Antunes PhD Merit Awards Announcement**
(13A) Aparajita Lahree, Maria Mota Lab
(13B) Cristina Ponte, João Eurico da Fonseca Lab
Sponsored by CSL Behring

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iMM Highlights 2022

JULY

SEPTEMBER

14 RAISE European Researchers' Night
Champalimaud Foundation, Lisbon

2nd COLife Community Meeting
Forte S. Julião da Barra, Oeiras

1st IMM Sustainable Flea Market
Green Team Initiative

OCTOBER

16 RiboMed Innovation Challenges
(2nd edition)

17 FIC.A Science Festival
Presentation of the digital game Neuropal

Out of Our Box
Mind the Gap
Miguel Herdade

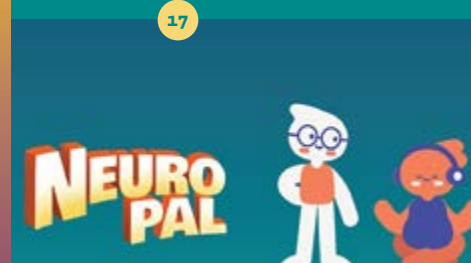
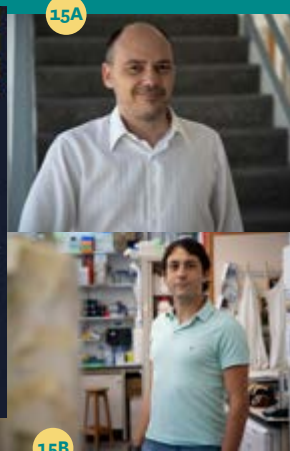
NOVEMBER

18 COLife Postdoc Day 2022

19 2022 Scientific Prize by the Universidade de Lisboa
Luísa Lopes (Group Leader)
Nuno Santos, Honorable mention (Group Leader)

DECEMBER

21 IMM Christmas Party
(or whatever you wanna call it)



22

IMM Highlights 2022

Out of Our Box
Tonic App: Making clinical practice even more practical
Daniela Seixas

Out of Our Box
The environmental sustainability of science
Martin Farley - Green Team Initiative

IMM Postdoc Day

CaixaResearch Health Grants
"la Caixa" Foundation
(15A) Luísa Graça
(15B) Cláudio Franco (group leaders)

IMM Alumni Community network launch

SEPTEMBER

Welcome Session for Master Students

Human Resources Excellence in Research Award by the European Commission

OCTOBER

20 Gilead GÉNESE Program
(8th edition)
Cláudia Faria, João Barata Lab and Biobank
Maria Carmo-Fonseca (GroupLeader)

Out of Our Box
Cultivated meat – cellular agriculture approach to feed an increasing worldwide population
Vitor Espírito Santo

NOVEMBER

23

IMM Highlights 2022

2022, a year in review

iMM: our home for chasing questions:



DO YOU THINK THAT iMM CHANGED OVER THE LAST FEW YEARS? WHAT DO YOU THINK HAS CHANGED THE MOST AND WHAT WERE THE CONTRIBUTIONS OF THOSE CHANGES TO iMM?

One of the most positive changes I see is especially in the PhD committee and the different career related workshops. I did not even know during my first years of PhD what are the other alternative career paths there are in store for us specially after finishing PhD. Now with the amazing effort of the training hub and the students committee we are constantly exposed to the multi-dimensional opportunities we can pursue after the PhD.

One of the negatives I have noticed is that when I started my PhD, we the PhDs and the postdocs were always very curious about science going on besides our own field. I remember times when Monday Lectures were so full that it was astonishing. I think over the years people in iMM have become more restricted to listen or be curious about the science happening in their own field (which is obvious). I realized sometimes Monday seminars related to Neurosciences or Parasitology were only attended by researchers working in that area. I don't know if that is good or bad, but I can certainly tell you that in my first years of PhD, we as iMMers were full of curiosity of what is happening beyond our own comfort zone and that Monday seminars were full of a multidisciplinary audience.

Debanjan Mukherjee

PhD student,
Maria Mota Lab

"I would say 2 spaces that I miss the most now that I have left iMM... One is where our Monday lecture happens..."



HOW DID iMM INFLUENCE YOUR PROFESSIONAL PATH? HOW DID IT INFLUENCE YOUR VIEWS ON SCIENCE AND SCIENTIFIC WORK?

I think iMM taught me how to do collaborative research which actually led me to do a PhD project involving Parasitology, Immunology and Microbiology. This kind of collaborative atmosphere that iMM has makes you think outside the box and chase bigger questions. I think iMM in a broader sense has made me develop to be an ambitious scientist with ideas of my own, yet at the same time be critical of my own work and have my mind open to other big ideas.

WHAT DO YOU BELIEVE COULD BE THE MAIN CONTRIBUTIONS OF iMM TO SCIENCE & SOCIETY IN THE FUTURE?

I think the unique thing that iMM has that most of the other scientific institutions kind of lacks, is its vicinity to one of the best hospitals in Portugal. This has led to collaborations with clinicians and transformed basic research with huge translational potential. I think in the near future with more and more collaborations with the doctors from the hospitals, iMM will be one of the pioneering research institutes with huge contributions to both basic and translational science for the society.

WHAT IS THE PHYSICAL SPACE AT iMM THAT MEANS MORE TO YOU, AND WHY?

I would say 2 spaces that I miss the most now that I have left iMM... One is where our Monday Lectures happen... because I still remember when I started my PhD I saw many big scientists give lectures to us as LisbonBiomed PhD students and gradually with time when I finally gave a talk in the same room at the CAML PhD students meeting, I was nervous but somehow gave me a confidence boost that 4 years down the line I can also stand up there and share my story with the iMM community. From a beginner's perspective, in the same room I was a spectator to fantastic discoveries. Four years later in the same room I was sharing my own discoveries to the spectator, a defining moment in my life and an auditorium to remember. And of course the 3rd floor terrace, not because of the food I am sorry, but so many amazing gatherings that made me realize PhD is not just about pipetting, reading articles, but sharing our own vulnerabilities, strengths and most importantly enjoy the times (for me very amazing times) with our great friends and colleagues amidst the bright sky of Lisbon.

DO YOU THINK THAT iMM CHANGED OVER THE LAST FEW YEARS? WHAT DO YOU THINK HAS CHANGED THE MOST? WHAT WERE THE CONTRIBUTIONS OF THAT CHANGE TO iMM?

My first visit to the iMM was in December 2003, when I was looking to return to Portugal after my PhD and Postdoc at UCL in London and got in touch with Ana Espada de Sousa. The iMM building had not opened yet, and following my interview with Ana at the hospital, she gave me a tour of the building which was still being finished. I wrote my first grant proposal a few months later and started working in a very empty building in the following year. So, you can guess that from my first impressions of iMM in 2003 to today, the institute changed a huge amount and I cannot pinpoint what changed the most. However, the main driving factor was the people, of course. Since my first tour of the iMM, the labs, the corridors and lecture theaters have filled up, the building has gained life and science took over and grew tremendously. It has been an amazing thing to witness. I still remember talking to Domingos Henrique to discuss how to get some sort of seminars up and running because in the beginning there was not much going on. The first seminar series was “The Cake Seminars” (where there was cake of course), and from then on things took on a life of their own. New groups started and a new vibrant institute took shape very fast. The main contributors to this change? The iMMers, of course!

HOW DID iMM INFLUENCE YOUR PROFESSIONAL PATH? HOW DID IT INFLUENCE YOUR VIEWS ON SCIENCE AND SCIENTIFIC WORK?

I have been at the iMM for the greatest part of my career. While at iMM I grew as a scientist,

Maria Soares

Postdoc,
João Lacerda Lab

“Our tiny office/lab in the early days of João Lacerda’s lab. We were a mini team that worked closely together in a small space.”

I experienced running a busy core facility for a few years, and then went back to my first love, which is translational science where we take the greatest advantage of being within the hospital campus to work on patient-oriented research. Being at iMM from the beginning has shown me that everything is possible in science, as long as you have determination, drive and, in Portugal, a great deal of improvisation and ability to maximize resources. The iMM started out small and grew to an internationally recognized research institute that competes at the highest level, in a country with very limited financial resources and, at the time, a huge gap between scientists and society. That’s quite impressive.

WHAT DO YOU BELIEVE COULD BE THE MAIN CONTRIBUTIONS OF iMM TO SCIENCE & SOCIETY IN THE FUTURE?

There has been a clear aim to bridge science with society and that became most evident during the SARS-CoV-2 pandemic. In a time of crisis, scientists gained visibility, their efforts were clearly appreciated, and they became a trusted source of information. As such, the iMM can continue to contribute to society not only with scientific discoveries, but also as science “educators”.

This is particularly important in times where misinformation has become mainstream and with that, a very dangerous political weapon. It is only by informing, clarifying and communicating with society that significant progress can be made. The impact of cutting-edge science will be severely impaired if society rejects or is oblivious to science. The greatest scientific advances in cancer treatment or in vaccines will be redundant if we cannot convey their importance to society. It is an uphill battle that ultimately prevents cancer patients from resorting to dubious alternative medicines or fractions of the population from rejecting vaccination, for example. So, the future contributions of iMM to society always have to be two-fold: Amazing science and equally amazing science communication/engagement.

WHAT IS THE PHYSICAL SPACE AT iMM THAT MEANS MORE TO YOU, AND WHY?

That is a tough one. But it has to be our tiny office/lab in the early days of João Lacerda’s lab. We were a mini team that worked closely together in a small space. It was special not because of the space itself, but the people of course, working with great people was for sure the best.



José Rino

Bioimaging Unit Director

“P2-A-22 is the room where I have spent more hours at a microscope. It’s the room where I have trained more people.”

DO YOU THINK THAT iMM CHANGED OVER THE LAST FEW YEARS? WHAT DO YOU THINK HAS CHANGED THE MOST AND WHAT WERE THE CONTRIBUTIONS OF THOSE CHANGES TO iMM?

Yes, much like a person, the iMM grew and changed as it got older and more experienced. It attracted and connected with talented exceptional people, growing in number of researchers and top-level labs. It learned how to quickly adapt to a fast-changing world, it became more self-aware of its identity and diversity. The pandemic challenge brought out its best, as it quickly gathered a task force to solve a big societal problem. Growth requires a stronger support structure, and iMM technical and administrative facilities were heavily reinforced and equipped, becoming more specialized, and efficient. The iMM became better at what it does – outstanding science, and it became well known and respected for it.

As I think happens with a person, it has not changed its personality: its vision, its ambition to lead the way in basic and clinical research, to improve peoples’ quality of life, none of it has changed. The iMM has grown spectacularly over the last few years and is now a young adult, very well guided and with eyes set on the future, dreaming big on how to change the world for the better, and very well prepared to do it.

HOW DID iMM INFLUENCE YOUR PROFESSIONAL PATH? HOW DID IT INFLUENCE YOUR VIEWS ON SCIENCE AND SCIENTIFIC WORK?

I am a physicist by training that became a microscopist at iMM. I joined the Carmo-Fonseca Lab just before the iMM was created. I was driven by pure curiosity, fascinated by the world of confocal microscopy and bright fluorescent proteins inside living cells (I still am). I was given the opportunity to work in microscopy with outstanding collaborators at different institutes. I finished my PhD in Biophysics already at the iMM, and shortly after a microscopy facility was created. I think the iMM didn’t just influenced, it created my professional path. My views on science and the scientific work were certainly strengthened at the iMM. The scientific process is very open, well discussed and taught everywhere at iMM, be it in a seminar or in the cafeteria.

WHAT DO YOU BELIEVE COULD BE THE MAIN CONTRIBUTIONS OF iMM TO SCIENCE & SOCIETY IN THE FUTURE?

I have no doubt that the iMM will change society for the better with its outstanding science. The easiest prediction is that the iMM community will continue to inform, educate, and raise awareness about science to

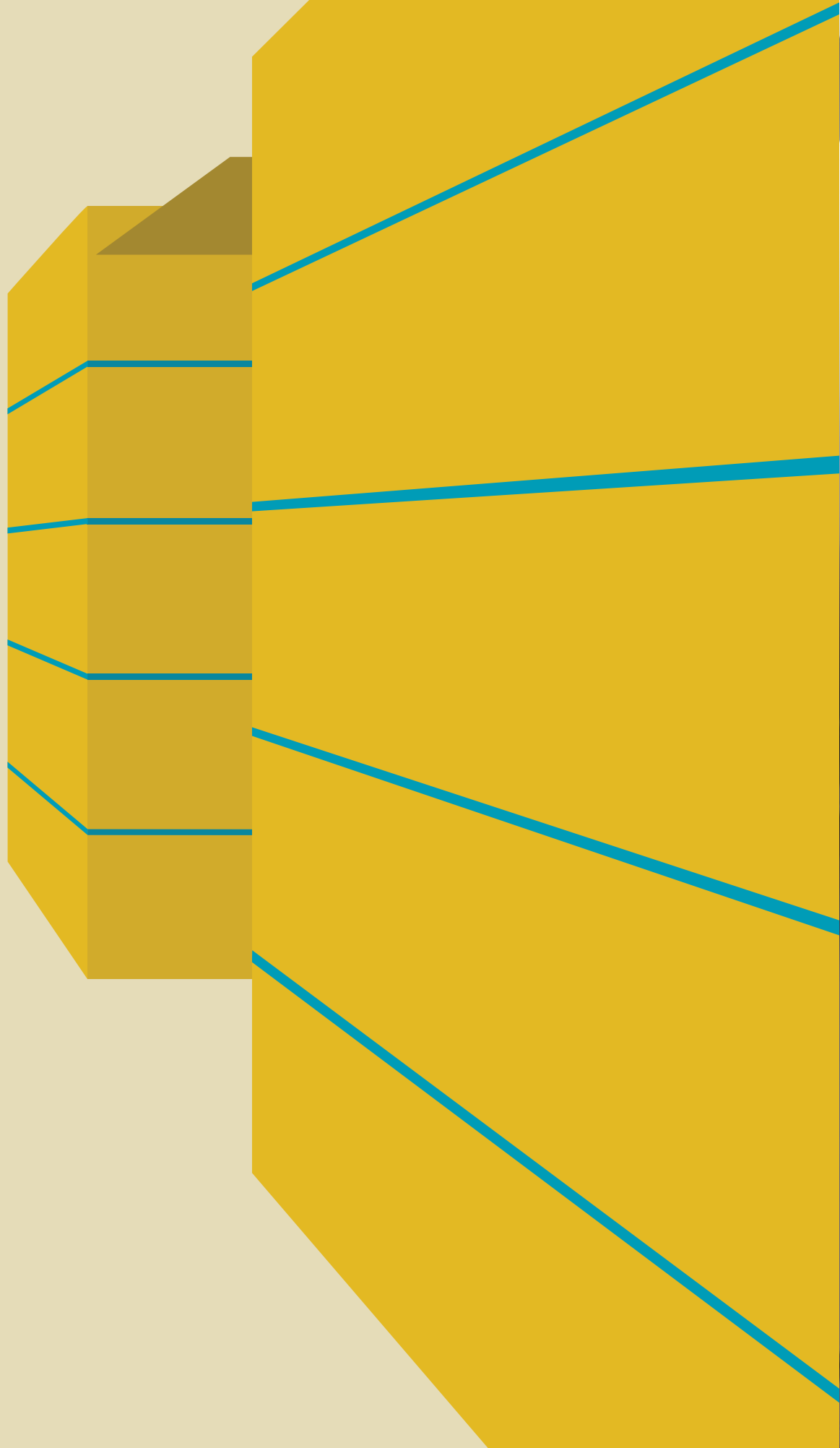
non-experts, from young students to a broader public. This is a very important contribution. The hardest prediction is to guess what the iMM main scientific breakthroughs will be. These are unknown by definition. New challenges, new and difficult health problems will certainly threaten society in the future. I believe the iMM will find great solutions for them.

WHAT IS THE PHYSICAL SPACE AT iMM THAT MEANS MORE TO YOU, AND WHY?

One of the microscopy rooms, of course. P2-A-22 is the room where I have spent more hours at a microscope. It’s the room where I have trained more people and where I think I have been of most help. It’s where I have shown the world of fluorescent cells to very special guests, including school kids as young as 3 years old. It’s where I have often witnessed the moment of discovery, when something was being seen for the first time, unknown yet to everyone else outside that room. It looks like a dark place, until you realize it’s full of light and wonder.



Science:



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Tying a lace on cell fate

New study finds structures in the DNA that regulate gene expression

All our cells contain the same genetic information. Yet, our different tissues are made of different types of cells. In each specific cell, different genes are active at different times, creating an immense diversity and functions for each cell type. A new study led by Sérgio de Almeida, group leader at IMM and Professor at Faculdade de Medicina da Universidade de Lisboa (FMUL) and published in the scientific journal *eLife* discovered a new mechanism to regulate gene expression in cells. This discovery is implicated in the regulation of which genes are active at a certain time in a cell, crucial to define the cell type and function, and that can also be important in DNA damage, which is involved in diseases such as cancer.

While copying the information in the DNA to the messenger RNAs, by the process known as transcription, the DNA can come together with the new RNA molecule. This interaction forms structures called R-loops. These structures are formed naturally between the DNA and RNA and are important regulators of gene expression, but can also lead to DNA damage. “The R-loops are structures that resemble a shoelace loop and are formed when the RNA molecule binds to one of the strands of the DNA during transcription. These R-loops have important regulatory effects, but can damage the DNA when they persist if cells are not able to solve them”, explains Sérgio de Almeida, leading researcher of the work.

“When we were looking at the genome, we saw that R-loops occur more frequently in specific regions of the DNA that have an alteration usually associated to higher levels of transcription” starts to explain João Sabino, first author of the study, adding “the R-loops are more common in DNA sequences that are actively read by the cell machineries at a certain time and define the identity of the cell”.

Using embryonic stem cells in the lab, a type of cell that still has the potential to originate all different cell types, the researchers observed that the formation of these DNA-RNA structures is important to regulate the genes that are expressed. The formation of the R-loops in these regions of the DNA can be important to determine the fate and differentiation of the cells.

“Basically, they are implicated in the process by which a cell ends up as a heart cell, a neuron, a muscle, or any other cell! Besides the regulation of the fate of the cells, the R-loops could be also involved in other processes, says Sérgio de Almeida, and adds: “Importantly, these “shoelaces” can damage the DNA if the cell machinery cannot solve them. Damage in the DNA molecules is a hallmark of different cancer diseases and is involved in cell dysfunction.”

This work was developed at IMM in collaboration with researchers from the Institute for Health and Bioeconomy and UCIBIO-REQUIMTE at the NOVA School of Science and Technology (Lisbon, PT). This study was funded by the EU Horizon 2020 Research and Innovation Programme, and national funds from the Portuguese Foundation for Science and Technology.

Sabino JC, Almeida MR, Abreu PL, Ferreira AM, Caldas p, Domingues MM, Santos NC, Azzalin CM, Grosso AR, Almeida SF (2022) [Epigenetic reprogramming by TET enzymes impacts co-transcriptional R-loops](#). *Elife*. 11:e69476. DOI:10.7554/eLife.69476

Dressing up RNA molecules to last

New mechanism discovered in parasite that causes sleeping sickness can explain virulence

A study led by Luísa Figueiredo, group leader at IMM and Professor at Faculdade de Medicina da Universidade de Lisboa (FMUL) and published in the prestigious scientific journal *Nature* described a new mechanism that decorates the end tails of RNA molecules, and prevents their degradation. This phenomenon, discovered for the first time in *Trypanosoma brucei*, the parasite that causes sleeping sickness, could be determinant for the virulence of the parasite. This fundamental discovery opens new avenues for treatment strategies for this disease but also for other RNA-based infections/diseases.

“RNA molecules are essentially the “messengers” that take the information encoded in genes to produce the machines that act inside cells of every single living organism, the proteins. But these molecules are mostly unstable, and the life expectancy of RNA molecules is an important determinant of gene expression”, starts to explain the leading researcher, Luísa Figueiredo. “Our lab studies *Trypanosoma brucei*, the parasite that causes sleeping sickness in humans. We have been keen to understand how this parasite causes disease in humans and cattle. There is a crucial protein in this process called VSG, a major cell-surface protein that has the ability to change periodically to evade the recognition of the parasites by the immune system.”

Luísa Figueiredo's team discovered that the ends of the RNA molecules that will produce the VSG are modified, resulting in a new level of regulation of the lifetime of these molecules. “Before RNA is degraded, these endings, or tails, are progressively removed by the cell machinery.

This is the first step in the degradation of RNA molecules that are no longer needed and is observed across all eukaryotes, including animals, plants, and parasites. What we have found is that in these VSG RNA molecules there is a modification that confers protection to degradation, similar to an “invisibility coat”, adds Idálio Viegas, PhD student and first author of this study. As these modified RNA molecules go unnoticed by the cell machinery, the degradation of the molecules is prevented.

And what is the relevance of this discovery for the infection with this parasite? “The VSG protein has the ability to change periodically to evade the recognition of the parasites by the immune system, and the regulation of the stability of these RNA molecules can be determinant for the virulence of the parasite. Therefore, the discovery of this new step can contribute to the development of new strategies to target sleeping sickness”, states Idálio Viegas.

“This discovery that the tails of RNA can be modified to control the lifetime of the molecules also alters the current perspective in RNA biology, opening new possibilities that have to be studied further. It's likely that these modifications are also present in other eukaryotes, including humans and probably represent a general mechanism to regulate the lifetime of RNA molecules and gene expression in all eukaryotes, but so far have gone unnoticed”, adds Luísa Figueiredo.

This work was developed at IMM, in collaboration with researchers from Cornell University (USA), and the University of York (UK). This study was funded by the Howard Hughes Medical Institute, the CaixaResearch Programme of the “la Caixa” Foundation, and the European Molecular Biology Organization. This work was also partially supported by FEEI - “Fundos Europeus Estruturais e de Investimento” and by national funds from the Portuguese Foundation for Science and Technology (FCT).

Viegas IJ, de Macedo JP, Serra L, De Niz M, Temporão A, Silva Pereira S, Mirza AH, Bergstrom E, Rodrigues JA, Aresta-Branco F, Jaffrey SR, Figueiredo LM (2022) *N6-methyladenosine in poly(A) tails stabilize VSG transcripts*. *Nature*. 604(7905):362-370. DOI:10.1038/s41586-022-04544-0

Brain metastasis looking back in the mirror



New study creates a library of models derived from cancer patients to study brain metastases

The spreading of different types of cancer cells to the brain, forming brain metastases, is the main cause of morbidity and mortality associated to cancer. A study led by Cláudia C. Faria, senior researcher in the group of João Barata at IMM and neurosurgeon at the Hospital Santa Maria (HSM, CHULN, Portugal), and published in the scientific journal *Cell Reports Medicine*, created a library of models to study brain metastases that recapitulate the disease in humans. These models can be a relevant tool to understand the disease and discover new therapeutical approaches tailormade to each patient.

“We collected brain metastases from cancer patients, that originated from tumors located in different organs, and used those metastatic cells to generate models that mimic the disease of each patient, including the dissemination of the cancer cells to form metastases. These unique and tailored disease models can now be used to study brain metastases and test new anticancer compounds”, explains Cláudia C. Faria, first author and leader of the study. The mice models were obtained using cells from metastases samples from patients undergoing surgery at the Hospital Santa Maria. “We created mice models using brain tumor tissue derived directly from patients. These models work like a library that mimics the characteristics of each patient observed in the clinic. We can now go back to this library to study cancer brain metastases”, adds Rita Cascão, also first author of the study.

The tumor models reflect the clinical manifestations of the cancer in the patient. Cancer cells in these models disseminate to the same organs as in the patients, and the tumor formation is more efficient when using cells from patients with more aggressive disease. Besides the similarities with the clinical development of the tumors, the models also repeat the biological characteristics of the originating tumour since the genes that are active in the cancer cells in mice are similar to the ones that are active in the patients. These tools can be valuable for personalized medicine, to decipher the best clinical approach to treat each individual patient. “The models that we created in this study are like mirrors that recapitulate the disease in humans”, says Cláudia C. Faria, and adds “like mirrors, the models can be used to study attentively the disease”.

In this study, the researchers tested the ability of these models to serve as tools to evaluate the therapeutic value of different therapies. The team tested two known drugs that are already used as cancer treatments in the clinic and act upon processes implicated in the formation of metastases. Similar to the clinic, these treatments are efficient and reduce the growth and size of the tumours in the models. By testing these accepted treatments and showing their efficiency, the researchers demonstrated the potential of the models to explore new therapeutic approaches for brain metastases in the future.

This work was developed at IMM in collaboration with the Department of Neurosurgery and the Laboratory of Neuropathology from the Hospital de Santa Maria, Centro Hospitalar Universitário Lisboa Norte (Portugal), and with researchers from the European Bioinformatics Institute, European Molecular Biology Laboratory (UK). This study was funded by the Portuguese Foundation for Science and Technology (FCT), Millennium bcp Foundation and private donations.

Faria CC, Cascão R, Custódia C, Paisana E, Carvalho T, Pereira P, Roque R, Pimentel J, Miguéns J, Cortes-Ciriano I, Barata JT (2022) [Patient-derived models of brain metastases recapitulate human disseminated disease](#). *Cell Rep Medicine*. 3(5):100623. DOI: 10.1016/j.xcrm.2022.100623

SARS-CoV-2 previous variants confer significant protection to Omicron BA.5 in vaccinated people for at least 8 months

Two studies in the population living in Portugal show that previous variants of the SARS CoV-2 virus, which causes COVID-19, confer considerable protection to the Omicron BA.5 variant in vaccinated people for at least 8 months

A study led by Luís Graça, group leader at IMM and full professor at the Faculdade de Medicina da Universidade de Lisboa, and Manuel Carmo Gomes, member of the Portuguese Technical Committee for Vaccination against COVID-19 of the Direção Geral de Saúde, and published in September 2022 in the *New England Journal of Medicine**, showed that people infected by the first Omicron subvariants of SARS-CoV-2, circulating in January and February 2022, have considerable protection to the Omicron subvariant BA.5 which was the most common variant since June. In early 2023, a follow up of this study was published in *Lancet Infectious Diseases*** showing that the protection is maintained for at least 8 months after the first infection.

“People who have been infected by Omicron subvariants BA.1 and BA.2 have protection for subvariant BA.5, circulating since June, about four times higher than vaccinated people who have not been infected on any occasion”, explains Luís Graça, at the time the first study was published. “Infections in 2020 and 2021 also confer protection for the most recent Omicron variant, although this protection is not as high as that of individuals infected with the BA.1 and BA.2 variants in early 2022” continues Luís Graça.

To conduct these studies, the researchers had access to the Portuguese registry of cases of COVID-19. “We used the national registry of COVID-19 cases to obtain the information of all cases of SARS-CoV-2 infections in the population older than 12 years old and residing in Portugal. The variant of each infection was determined taking into account the date of infection and the dominant variant at that time. We analysed infections caused by the first Omicron variants BA.1 and BA.2 together because the transition between the two was very slow, not allowing for their distinction. With these data, we analyzed the probability of an infected person becoming infected again with the current variant, allowing us to calculate the percentage of protection

provided by the previous infections,” explains João Malato, first author of both studies.

“These results are very important because the adapted vaccines that are in clinical development, as well as Moderna’s recently licensed bivalent vaccine in the UK, are based on the BA.1 variant of the virus that causes COVID-19, which was a dominant variant in the infections in January and February 2022. Until now, it was not known how much protection this subvariant confers against the virus that is currently circulating. These results show that the protection is very significant and allow us to anticipate the benefit of vaccines that are currently in clinical development”, adds Luís Graça on the relevance of the first study.

Later, in the second study, the researchers were able to gather more information on the longevity of this protection, as detailed by Manuel Carmo Gomes: “The protection obtained by infection in vaccinated people is initially around 90%. After 5 months there is a reduction to around 70%, and a stabilization to 65% after 8 months of the first infection. This shows that the protection to Omicron BA.5 conferred by previous infection by SARS-CoV-2 in vaccinated people is quite stable”.

These studies deconstructed the perception that early SARS-CoV-2 variants did not confer protection against the Omicron BA.5 variant, which was motivated by the high number of people infected in early 2022 who were reinfected at the time of BA.5 dominance. This analysis of the Portuguese population showed that the apparent lack of protection was due to the high number of cases in Portugal in the first quarter of 2022 of almost 1/3 of the population. Despite the high and stable protection, the high number of cases in the general population led to a large number of people becoming infected again.

This work was conducted by IMM and the Direção Geral de Saúde, in collaboration with researchers from the Centro de Estatística e Aplicações at the University of Lisbon, the Faculty of Sciences of the University of Lisbon, and Los Alamos National Laboratory (USA). This work was funded by the Horizon 2020 Research and Innovation Programme of the European Union, the Portuguese Foundation for Science and Technology (FCT), and the National Institute of Health.

* Malato J, Ribeiro RM, Leite PP, Casaca P, Fernandes E, Antunes C, Fonseca VR, Gomes MC, Graça L (2022) *Risk of BA.5 infection among persons exposed to previous SARS-CoV-2 variants*. *N Engl J Med*. 387(10):953-954. DOI:10.1056/NEJMc2209479

** Malato J, Ribeiro RM, Fernandes E, Leite PP, Casaca P, Antunes C, Fonseca VR, Gomes MC, Graça L (2023) *Stability of hybrid vs. vaccine immunity against BA.5 infection over 8 months*. *Lancet Infect Dis*. 23(2):148-150. DOI: 10.1016/S1473-3099(22)00833-7

Tracking malaria parasites in space and time

Scientists reconstructed the infection by *Plasmodium* parasites in the asymptomatic phase of malaria in the liver

Malaria is a devastating disease caused by the *Plasmodium* parasite. After an infected mosquito's bite, the parasites travel to the liver and infect liver cells. This phase of the infection is asymptomatic. A new study led by Maria Manuel Mota, group leader and executive director at IMM, and Shalev Itzkovitz, group leader at the Weizmann Institute of Science, in Israel, and published in the scientific journal *Nature*, found for the first time that the outcome of the malaria infection is linked to the spatial location of the infected cells in the liver. This atlas of the liver stage of the malaria infection is crucial because solving the infection at this stage would prevent the development of the disease.

The researchers tracked the infection by *Plasmodium* parasites in the liver by looking at the localization of the parasites over time and were able to create an atlas of the liver infection by applying an innovative approach. "The liver is formed by thousands of lobules. The lobules are groups of liver cells that are organized in the shape of hexagons. We found that the outcome of the infection is different depending on the zone of the lobules infected by the malaria parasites. The parasites develop faster and survive better in the regions closer to the center of these hexagon-shaped lobules", said Shalev Itzkovitz, one of the leading researchers of this study, on the main findings of this work.

The team analyzed the active genes of the liver cells and the parasites at different times after

infection, using mice as a model. Since the genes that are active in the liver cells depend on their localization, the researchers were able to pair each parasite to its localization in the liver and reconstruct their paths by checking over the time of the infection. "We found a group of parasites located in the edge of the lobules that are not able to develop an infection", continues Shalev Itzkovitz.

"We called these cells in the liver where the parasites are not able to develop an infection 'abortive liver cells'", says Maria Manuel Mota, co-leader of the study. "It's almost as if these cells are hostile to the parasites and the parasites have to 'abort the mission'. We found that the immune response that these cells are able to promote in response to the parasites is different", explains Maria Manuel Mota.

The liver stage of the malaria infection is hard to study due to the heterogeneity of the liver. "I have been studying the liver stage of malaria for 20 years, and this study is a turning point. We now have information on how both the liver cells and the *Plasmodium* parasites behave during infection, in time and space. This information will pave the way for our future research. We can use the vulnerabilities of the *Plasmodium* that we found in this study to try to develop ways to clear the infection in the liver stage, that is asymptomatic", says Maria Manuel Mota.

This study created a detailed atlas of the infection by the parasites that cause malaria in the liver. Deciphering the dynamics of the infection at this asymptomatic stage is important because it will feed the research on how to stop the infection in the liver and eliminate the disease before the symptoms appear.

This work was funded by the Wolfson Family Charitable Trust, the Edmond de Rothschild Foundations, the Fannie Sherr Fund, the Dr. Beth Rom-Rymer Stem Cell Research Fund, the Helen and Martin Kimmel Institute for stem cell research, the Minerva Stiftung grant, the Israel Science Foundation, the Broad Institute Israel Science Foundation, the European Research Council under the European Union's Horizon 2020 Research and Innovation Programme grant, the Chan Zuckerberg Initiative, the Bert L. and N. Kuggie Vallee Foundation, the Howard Hughes Medical Institute, the European Molecular Biology Organization, "la Caixa" Foundation and the Portuguese Foundation for Science and Technology (FCT).

Afriat A, Zuzarte-Luís V, Bahar Halpern K, Buchauer L, Marques S, Chora F, Lahree A, Amit I, Mota MM, Itzkovitz S (2022) [A spatiotemporally resolved single-cell atlas of the Plasmodium liver stage](#). *Nature*. 611(7936):563–569. DOI: 10.1038/s41586-022-05406-5

International Projects:



European Research Council

The impact of germline metabolic reprogramming on reproduction and physiology

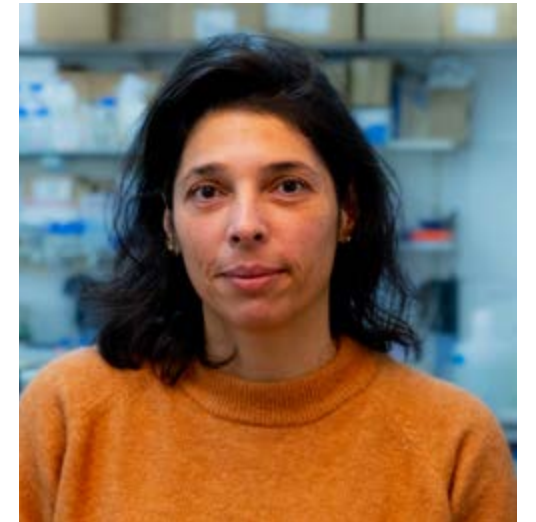


Zita Carvalho-Santos was awarded a **Starting Grant by the European Research Council** to study the interplay between nutrition and female fertility. Starting in 2023, Zita will establish herself as a group leader of a new laboratory at IMM.

Animals are composed of different cell types with different functions. For animal organs to achieve their functions, the metabolic requirements of each cell type need to be coordinated at the level of the whole-organism via nutrition. This integration between tissues and organs is important for regulating animal physiology, namely reproduction. Zita Carvalho-Santos will use the fruit fly, an established animal model, to **discover novel mechanisms that allow organisms to integrate cellular metabolism with tissue functions and the communication between organs to control reproduction.**

TOTAL AMOUNT: 1 481 513€

A microRNA-regulated cell death-inducing gene therapy for T-cell Acute Lymphoblastic Leukemia



Rita Fragoso, postdoctoral researcher, and João Barata, group leader at IMM, were awarded a **Proof of Concept Grant by the European Research Council** to develop new targeted therapies for T-cell Acute Lymphoblastic Leukemia (T-ALL).

T-ALL is an aggressive cancer that arises from an abnormal increase in the number of a subtype of leukocytes, called T-cells, and is highly common in children. Current treatments are efficient in over 80% of pediatric cases, but are aggressive, and result in frequent secondary effects. In this project, **the team will use genetic therapy targeting crucial proteins for T-cell development and the establishment of leukemia.**

TOTAL AMOUNT: 150 000€

“la Caixa” Foundation

Diana Matias was awarded with a “la Caixa” Postdoctoral Junior Leader Grant funded by the “la Caixa” Foundation. The program is designed to encourage innovative, high-quality research in Portugal and Spain and to support the best scientific talent by offering an attractive and competitive environment in which to carry out research of excellence.

Polymeric nanoparticles-based multivalent mABs against glioblastoma for T-cell engagement



Diana Matias, researcher in Luís Graça Lab, will develop a project that aims at designing a therapeutic strategy for the brain tumor glioblastoma by hijacking a type of immune cells, T-cells, at the tumor site. Glioblastoma is an incurable and highly fatal tumor for adults and children, namely because conventional therapies fail to reach the brain due to the brain-blood barrier, and due to immune suppression at the tumor site.

In this project the researchers **will design a nanoparticle, able to reach the brain, that will recognize the tumor cells and activate and recruit T-cells to the tumor site.** This therapeutic approach could also be applied to several diseases, benefiting specially those with compromised immune systems.

TOTAL AMOUNT: 286 900 75€

Cláudio Franco and Luís Graça were two of the thirty three grants awarded in 2022 under the program Health Research Grants funded by the “la Caixa” Foundation. The program was designed to support groundbreaking projects of scientific excellence with potential value and a high scientific impact developed in Portugal and Spain. IMM scientists will receive approximately 500 000€ each to develop their research projects in the areas of cardiovascular research and infectious diseases.

Endothelial cells as rheostats for age-related diseases



Cláudio Franco, group leader at IMM, will develop a project that will study **the role of endothelial cells, which line the interior of blood vessels, in healthy aging.**

As life expectancy in the developed countries has doubled in the last century, there is an equally significant increase in diseases associated with aging, including cancer, cardiovascular and neurodegenerative diseases. Healthy aging is therefore one of the main challenges facing modern society today, and a priority for biomedical research. The researchers will study the association between alterations in the vascular system, aging and the onset of age-related diseases.

TOTAL AMOUNT: 495 792€

Harnessing germinal centre regulation for improved vaccines



Luís Graça, group leader at IMM, will develop a project that will bring together experts in vaccines, nanoparticles and bioinformatics to explore a new strategy aimed at **boosting the immune system’s reaction so that vaccines do not lose their effectiveness.**

Although vaccines are generally highly effective, they are less so in some population groups, such as the elderly, because the immune system loses its ability to respond to threats over time. In this project, the researchers will explore a new strategy to administer antigens and immunomodulatory compounds to the germinal centre, influencing antibody production and contributing to increase vaccine efficacy.

TOTAL AMOUNT: 499 952€

European Commission

Boosting clinical research for the benefit of society (iMM-CARE)

iMM was awarded with a **Widening - Teaming for Excellence Grant from the European Commission** of 41 750 000€ to deliver a pioneering Centre of Excellence in human-centred clinical and translational research in Portugal. The project iMM-CARE teams up iMM with Vall d'Hebron Barcelona Hospital Institute of Research that will act as a role model and strategic partner to create the framework and actions to have the best health care and research on the campus of the Lisbon Academic Medical Centre. This Centre of Excellence will catalyze a continuum across stages of biomedical research, from bench to bedside and back again. The core of iMM-CARE is a mission-driven, human-centred, data-driven research and innovation (R&I) model as a new way to engage all stakeholders – citizens, patients, healthcare professionals, scientists, entrepreneurs, industry, health authorities and government – in interdisciplinary, cross-sectoral collaborations to solve health challenges. The broad collaborative efforts of iMM-CARE will leverage the power of new digital technologies and data and use open innovation and open science methods to accelerate R&I across healthcare. This will facilitate a rapid uptake of advanced technologies and solutions by healthcare systems at national and international levels driving structural changes that will lead to a modernized and more competitive biomedical and health R&I system in Portugal and the EU.

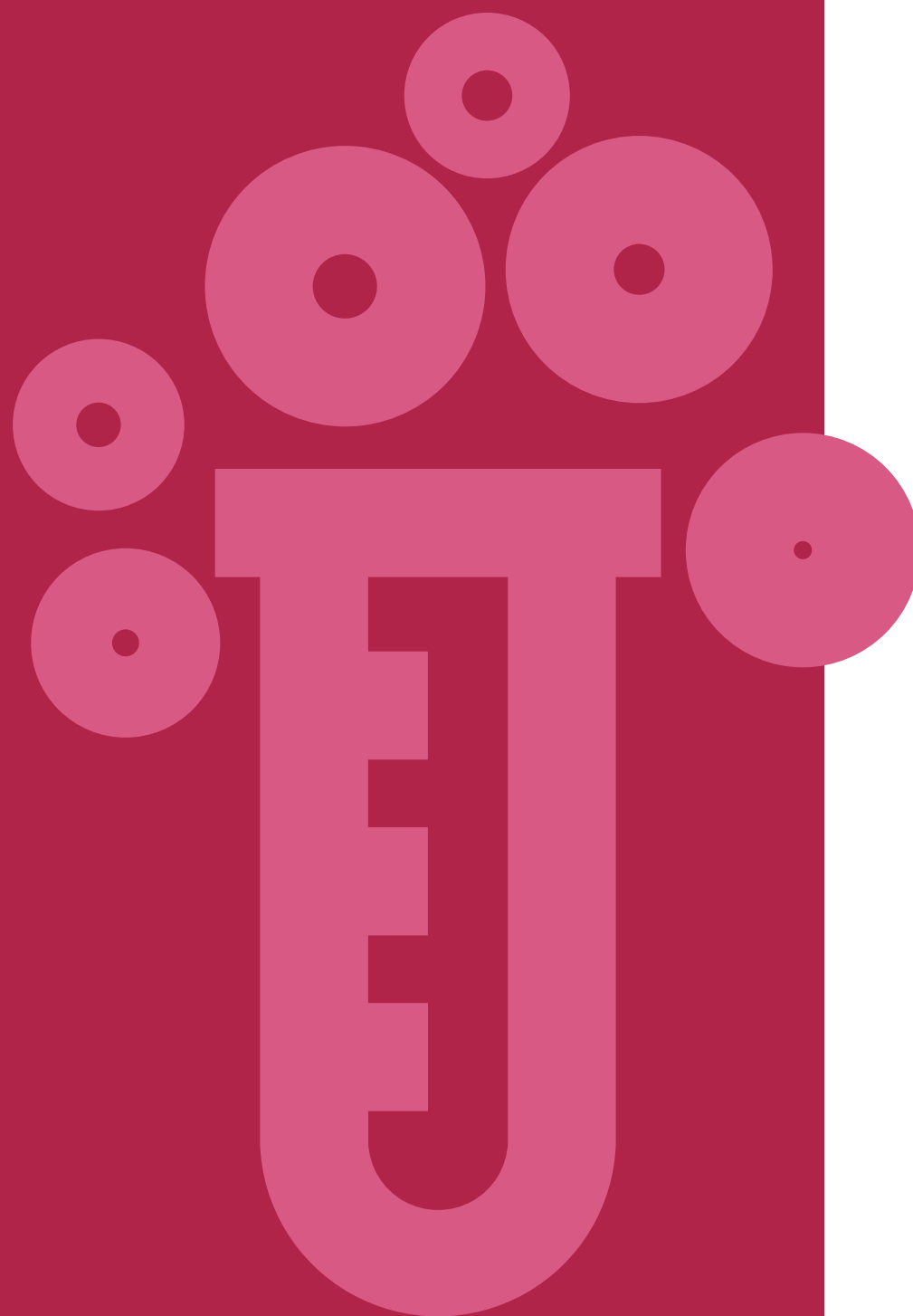
TOTAL AMOUNT: 41,75M€

European Commission: 15M€

National public funds: 15M€ + 2,75M€ (FCT)

Private funds: 9M€





Twinning of research institutions



EpiEpiNet brought together reputed neuroscientists with the aim of understanding the basic mechanisms of epileptogenesis and their impact in synaptic and brain circuitry dysregulation, and to contribute to the development of innovative therapies against refractory forms of epilepsy.

Partner Institutions: Amsterdam University Medical Center - University of Amsterdam, Sapienza Università di Roma and University of Lund

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 952455.



The SIMICA Project placed IMM within the core of a European network of laboratories that seeks to produce cutting-edge research in the field of antibody-drug conjugates. The conjugation of monoclonal antibodies directed against tumor marker proteins with highly potent cytotoxic drugs has emerged as a powerful strategy to create antibodies with improved antitumoral potential towards malignant cells or even turn antibodies lacking any cytotoxic activity into potent antineoplastic agents. The SIMICA Network strengthened the science and technology capacity of IMM in the study of protein drug-conjugates leveraging research excellence and creating value.

Consortium: Allcyte, Leiden University Medical Centre, Percuros B.V. (PERC), University of Cambridge

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 852985.



RiboMed established a strategic collaboration via twinning with partners from already well recognised communities working on RNA biology in the University of Oxford (UK), the Weizmann Institute of Science (Israel) and The Max Delbrück Center for Molecular Medicine (MDC, Germany), to organize staff exchanges, experts' visits, common works in laboratories, thematic courses, mentoring, conferences. This has promoted the translation of basic findings into potential novel biomarkers, RNA-based diagnostic assays and RNA therapeutic targets, and contributed to the consolidation of the innovation and entrepreneurship ecosystem at IMM in the field of RNA biology.

Partner Institutions: University of Oxford (UK), The Weizmann Institute of Science (Israel), The Max Delbrück Center for Molecular Medicine (MDC, Germany)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 857119.



Future and Emerging Technologies (FET)



The MyoChip project built a reconstituted 3D human skeletal muscle irrigated by vasculature and innervated by neurons. This organ-on-a-chip technology will have numerous applications including research on muscle building and aging, drug testing and screening, as well as prosthetics and biorobotics. The feasibility of the project relied on the interdisciplinary approach which joins a team of cell biologists, material engineers, experts in microfluidics and mathematical modelers.

Partner Institutions: Institut Curie (France)

The University Of Edinburgh (UK), Fluigent (France)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 801423.



The NOVIRUSES2BRAIN aimed at finding and selecting drug leads that are efficacious and able to translocate the blood-placental and blood-brain barriers so that Zika, Dengue, Chikungunya and other viruses can be targeted across barriers, including during pregnancy. The project gathers the expertise of medicinal chemists, biochemists, drug development specialists and virologists to create drug leads able to clear all viral species from the brain simultaneously.

Other beneficiaries: Universidad Pompeu Fabra, Spain
Synovo GmbH, Germany

Partner: Universidade Federal do Rio de Janeiro, Brazil

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 828774.

Single Market Program COSME

LEAP-BIO



LEAP-BIO intends to leverage the extensive expertise and networks of the consortium to develop an early-stage focused IP licensing intermediary service for biopharma small and medium-size enterprises and startup companies in the target regions - mainly Portugal, France, and Italy but also Spain and the Wallonian region in Belgium, contributing to a more competitive European biopharma industry at a global level.

Partner: Eurasanté (France), Instituto de Medicina

Molecular João Lobo Antunes (Portugal), Italbiotec (Italy)

This project has received funding from the European Union's Horizon Europe programme under grant agreement N° 101084048.



The SAFE-N-MEDTECH is a multicenter consortium led by Tecnologia Navarra de Nanoproductos SL that built an innovative open-access platform to offer to companies and reference laboratories, the capabilities, know-how, networks and services required for the development, testing, assessment, upscaling and market exploitation of nanotechnology-based medical and diagnostic devices.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 814607.

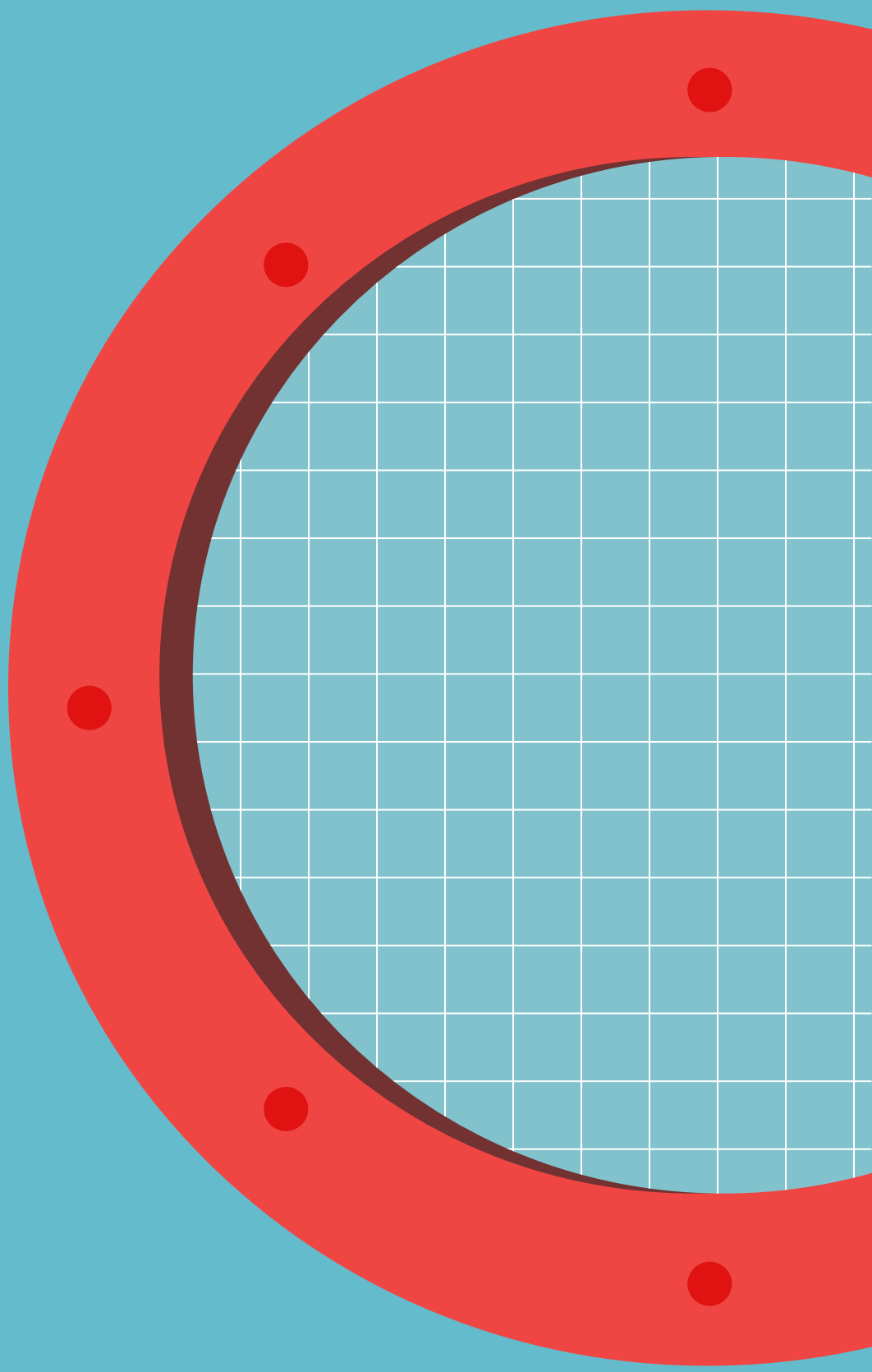
Societal Challenges - Health, demographic change and well-being

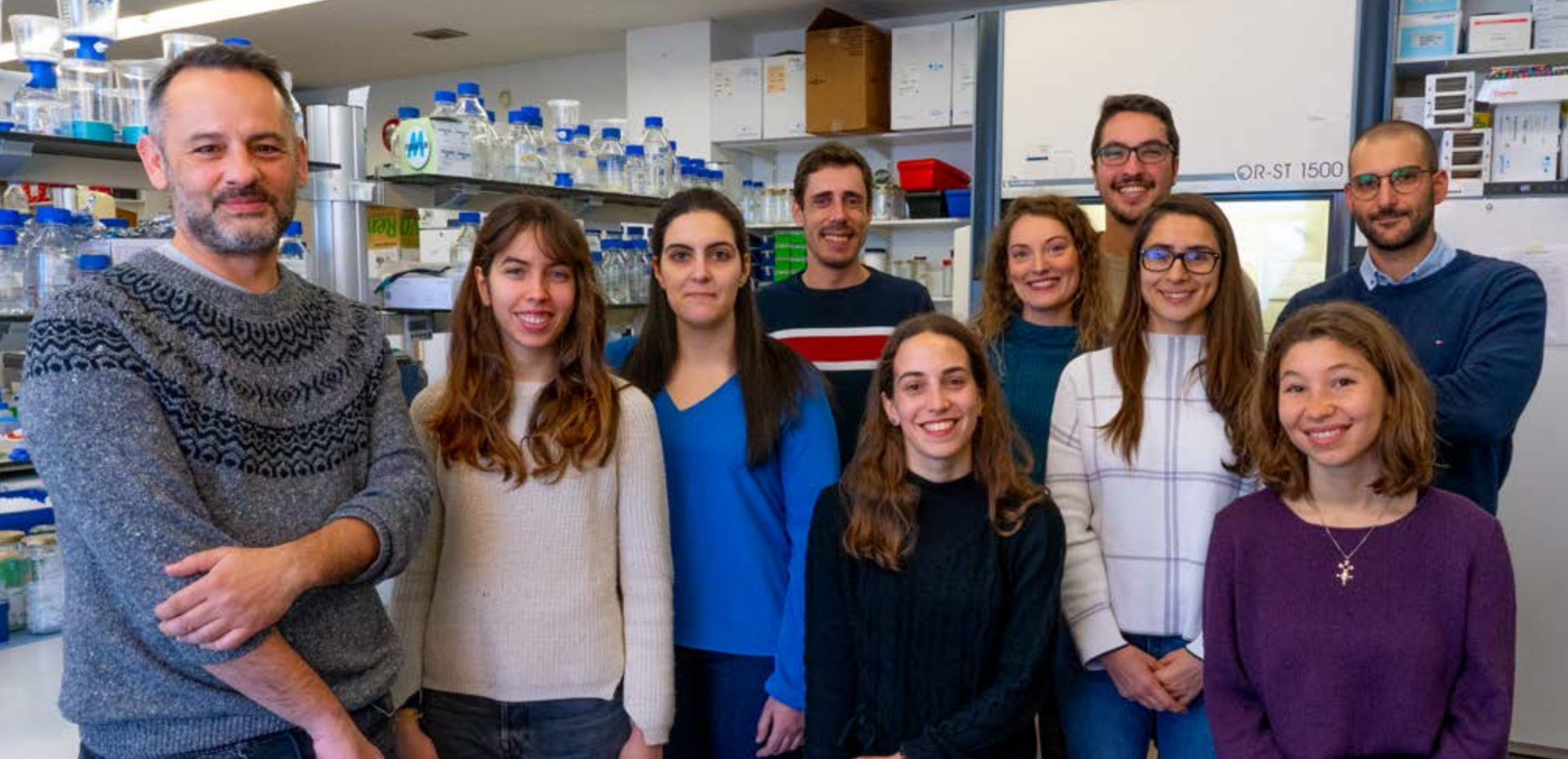


INNO4COV-19 is an 11-partner consortium led by INL – International Iberian Nanotechnology Laboratory that is looking for efficient and fast solutions that can help in the fight against COVID-19 jointly with the other actively involved industrial and Registered Training Organization partners. The project addressed the need for diagnosis prognosis and monitoring systems targeting COVID-19, with increased efficacy, efficiency and at a lower cost.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 101016203.

Labos Highlights:





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Claus M. Azzalin Lab

Telomeres, long noncoding RNAs & genome stability

We are interested in understanding how the telomeric long noncoding RNA TERRA regulates telomere structure and function in normal and diseased cells. Telomeres are nucleoprotein structures that “cap” the ends of eukaryotic chromosomes. Dysfunctional telomeres cause severe genome instability, which unleashes cellular reactions that are common hallmarks of human diseases including cancer and premature aging. In 2022, we focused on how TERRA supports telomere maintenance in human cancer cells, and how TERRA regulates the assembly of the telomere protective cap.

Selected Publications:

Abreu PL, Lee YW, Azzalin CM (2022) [In vitro characterization of the physical interactions between the long noncoding RNA TERRA and the telomeric proteins TRF1 and TRF2](#). *Int J Mol Sci*. 23(18):10463. DOI: 10.3390/ijms231810463

Sabino JC, Almeida MR, Abreu PL, Ferreira AM, Caldas P, Domingues MM, Santos NC, Azzalin CM, Grosso AR, Almeida SF (2022) [Epigenetic reprogramming by TET enzymes impacts co-transcriptional R-loops](#). *Elife*. 11:e69476. DOI: 10.7554/eLife.69476

Silva B, Arora R, Azzalin CM (2022) [The alternative lengthening of telomeres mechanism jeopardizes telomere integrity if not properly restricted](#). *Proc Natl Acad Sci USA*. 19(39):e2208669119. DOI: 10.1073/pnas.2208669119



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João Barata Lab

Signaling in cancer

We study the mechanisms of cancer development and metastasis in order to establish new ways to treat cancer. In 2022, we established a patient-derived xenograft of brain metastasis, led by Cláudia Faria, that may serve as translational platforms for precision medicine. In our work on acute lymphoblastic leukemia we discovered new insight on the interaction between IL-7 receptor and Myc mutations. Importantly, we patented technology that we believe can be groundbreaking for cancer treatment in the future.

Selected Publications:

Faria CC, Cascão R, Custódia C, Paisana E, Carvalho T, Pereira P, Roque R, Pimentel J, Miguéns J, Cortes-Ciriano I, Barata JT (2022) [Patient-derived models of brain metastases recapitulate human disseminated disease](#). **Cell Rep Medicine**. 3(5):100623. DOI: 10.1016/j.xcrm.2022.100623

Oliveira ML, Veloso A, Garcia EG, Iyer S, Pereira C, Barreto VM, Langenau DM, Barata JT (2022) [Mutant IL7R collaborates with MYC to induce T-cell acute lymphoblastic leukemia](#). **Leukemia**. 36(6):1533-1540. DOI: 10.1038/s41375-022-01590-5

Qin N, Paisana E, Langini M, Picard D, Malzkorn B, Custódia C, Cascão R, Meyer F-D, Blümel L, Göbbels S, Taban K, Bartl J, Bechmann N, Conrad C, Gravemeyer J, Becker JC, Stefanski A, Puget S, Barata JT, Stühler K, Fischer U, Felsberg J, Ayrault O, Reifemberger G, Borkhardt A, Eisenhofer G, Faria CC, Remke M (2022) [Intratumoral heterogeneity of MYC drives medulloblastoma metastasis and angiogenesis](#). **Neuro-oncol**. 24(9):1509-1523. DOI: 10.1093/neuonc/noaco68



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Gonçalo Bernardes Lab

Chemical biology & biopharmaceutical technology

We study chemistry principles to provide new fundamental knowledge in biology, and develop drugs whose action is restricted to the tissues where they maximize their therapeutic efficacy. In 2022, our successful projects included the development of a method to cut RNA sequences that is now being used to map RNA modifications and degrade specific RNAs structures that are essential in disease. In another example, we disclosed a method that “masks” cancer-killing drugs and avoids harming healthy cells.

Selected Publications:

Afonso CF, Marques MC, António JPM, Cordeiro C, Gois PMP, Cal PMSD, Bernardes GJL (2022) [Cysteine-assisted click-chemistry for proximity-driven, site-specific acetylation of histones](#). **Angew. Chem. Int. Ed.** 61:e202208543. DOI: 10.1002/anie.202208543

Dunsmore L, Navo CD, Becher J, Gil de Montes E, Guerreiro A, Hoyt E, Brown L, Zelenay V, Mikutis S, Cooper J, Barbieri I, Lawrinowitz S, Siouve E, Martin E, Ruivo PR, Rodrigues T, da Cruz FP, Werz O, Vassiliou G, Ravn P, Jiménez-Osés G, Bernardes GJL (2022) [Controlled masking and targeted release of redox-cycling ortho-quinones via a C-C bond-cleaving 1,6-elimination](#). **Nat. Chem.** 14:754–765. DOI: 10.1038/s41557-022-00964-7

Istrate A, Geeson MB, Navo CD, Sousa BB, Marques MC, Taylor RJ, Journeaux T, Oehler SR, Mortensen MR, Deery MJ, Bond AD, Corzana F, Jiménez-Osés G, Bernardes GJL (2022) [Platform for orthogonal N-cysteine-specific protein modification enabled by cyclopropanone reagents](#). **J. Am. Chem. Soc.** 144:10396–10406. DOI: 10.1021/jacs.2c02185

Sousa BB, Rebelo de Almeida C, Barahona AF, Lopes R, Martins-Logrado A, Cavaco M, Neves V, Carvalho LAR, Labão-Almeida C, Coelho AR, Leal Bento M, Lopes RMRM, Oliveira BL, Castanho MARB, Neumeister P, Deutsch A, Vladimer GI, Krall N, João C, Corzana F, Seixas JD, Fior R, Bernardes GJL (2022) [Selective inhibition of Bruton's tyrosine kinase by a designed covalent ligand leads to potent therapeutic efficacy in blood cancers relative to clinically used inhibitors](#). **ACS Pharmacol. Trans. Sci.** 5:1156–1168. DOI: 10.1021/acspsci.2c00163

Taylor RJ, Rangel MA, Geeson MB, Sormanni P, Vendruscolo M, Bernardes GJL (2022) [p-Clamp-Mediated homo- and heterodimerization of single-domain antibodies via site-specific homobifunctional conjugation](#). **J. Am. Chem. Soc.** 144:14404–14419. DOI: 10.1021/jacs.2c04747



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Maria Carmo-Fonseca Lab

RNA & gene regulation

We study molecular pathways and mechanisms that implicate RNA in human health and disease, such as RNA splicing, using a combination of cutting-edge cell imaging and genome-wide approaches. In 2022, we studied the 3D genome organization and found that peripheral and central regions of the nucleus harbor genes with different architectures that lead to distinct splicing outcomes. Since we are interested in mRNA splicing in the context of disease, we are also focused on developing assays to study cells differentiated from patient-derived stem cells.

Selected Publications:

Barbosa P, Ribeiro M, Carmo-Fonseca M, Fonseca A (2022) [Clinical significance of genetic variation in hypertrophic cardiomyopathy: Comparison of computational tools to prioritize missense variants](#). **Front Cardiovasc Med.** 9:975478. DOI: 10.3389/fcvm.2022.975478

Custódio N, Savisaar R, Carvalho C, Bak-Gordon P, Ribeiro MI, Tavares J, Nunes PB, Peixoto A, Pinto C, Escudeiro C, Teixeira MR, Carmo-Fonseca M (2022) [Expression profiling in ovarian cancer reveals coordinated regulation of BRCA1/2 and homologous recombination genes](#). **Biomedicines.** 10(2):199. DOI: 10.3390/biomedicines10020199

Matos S, Bernardo P, Esteves S, Botelho de Sousa A, Lemos M, Ribeiro P, Silva M, Nunes A, Lobato J, Frade MJ, da Silva MG, Chacim S, Mariz J, Esteves G, Raposo J, Espadana A, Carda J, Barbosa P, Martins V, Carmo-Fonseca M, Desterro J (2022) [Screening a targeted panel of genes by next-generation sequencing improves risk stratification in real world patients with acute myeloid leukemia](#). **Cancers.** 14(13):3236. DOI: 10.3390/cancers14133236

Silveira C, Sousa AC, Corredeira P, Martins M, Sousa AR, Da Cruz Paula A, Selenica P, Brown DN, Golkaram M, Kaplan S, Zhang S, Liu L, Weigelt B, Reis-Filho JS, Costa L, Carmo-Fonseca M (2022) [Comprehensive genomic profiling of cell-free circulating tumor DNA detects response to ribociclib plus letrozole in a patient with metastatic breast cancer](#). **Biomolecules.** 12(12):1818. DOI: 10.3390/biom12121818

Tammer L, Hameiri O, Keydar I, Roy VR, Ashkenazy-Titelman A, Custódio N, Sason I, Shayevitch R, Rodriguez-Vaello V, Rino J, Maor GL, Leader Y, Khair D, Aiden EL, Elkon R, Irímia M, Sharan R, Shav-Tal Y, Carmo-Fonseca M, Ast G (2022) [Gene architecture directs splicing outcome in separate nuclear spatial regions](#). **Mol Cell.** 82(5):1021-1034.e8. DOI: 10.1016/j.molcel.2022.02.001



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Miguel Castanho Lab

Physical biochemistry of drugs & targets

We study the biophysical principles that govern lipid-peptide interactions, with implications in viral fusion and translocation of the blood-brain barrier, aiming at the development of new drugs. In 2022, we discovered a conjugate effective against Zika virus that is able to transpose the blood-brain barrier, we explored a new antimicrobial peptide as an alternative approach to treat biofilm infections, and we showed the ability of a protein to cross the blood-brain barrier and play a role in neuronal dysfunction in HIV-1 associated neurocognitive disorder.

Selected Publications:

Caccuri F, Neves V, Gano L, Correia JDG, Oliveira MC, Mazzuca P, Caruso A, Castanho M (2022) [The HIV-1 matrix protein p17 does cross the blood-brain barrier](#). **J Virol**. 96(1):e0120021. DOI: 10.1128/JVI.01200-21

Cavaco M, Castanho MARB, Neves V (2022) [The use of antibody-antibiotic conjugates to fight bacterial infections](#). **Front Microbiol**. 13:835677. DOI: 10.3389/fmicb.2022.835677

Dias SA, Pinto SN, Silva-Herdade AS, Cheneval O, Craik DJ, Coutinho A, Castanho MARB, Henriques ST, Veiga AS (2022) [A designed cyclic analogue of gomesin has potent activity against Staphylococcus aureus biofilms](#). **J Antimicrob Chemother**. 77(12):3256-3264. DOI: 10.1093/jac/dkac309

Todorovski T, Mendonça DA, Fernandes-Siqueira LO, Cruz-Oliveira C, Guida G, Valle J, Cavaco M, Limas FIV, Neves V, Cadima-Couto Í, Defaus S, Veiga AS, Da Poian AT, Castanho MARB, Andreu D (2022) [Targeting Zika Virus with New Brain- and placenta-crossing peptide-porphyrin Conjugates](#). **Pharmaceutics**. 14(4):738. DOI: 10.3390/pharmaceutics14040738

Vieira-da-Silva B, Castanho MARB (2022) [The structure and matrix dynamics of bacterial biofilms as revealed by antimicrobial peptides' diffusion](#). **J Pept Sci**. e3470. DOI: 10.1002/psc.3470



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Luís Costa Lab

Translational oncobiology

Metastases are the hallmark of cancer lethality. Our main goal is to better understand the molecular mechanisms driving tumor progression at the metastatic site, and to unravel molecular signatures of organotropism. Our goal is patient-oriented, unraveling new biomarkers and therapeutic options for metastatic cancer.

In 2022, amongst other achievements, we participated in the genesis of The Global Consortium for Breast Cancer in Young Women, and we reported an exhaustive portrait of the interplay between genetic and microenvironment intra-tumor heterogeneity, depicting molecular events with predictive value of colorectal cancer progression and metastasis development.

Selected Publications:

Cruz-Duarte R, Rebelo de Almeida C, Negrão M, Fernandes A, Borralho P, Sobral D, Gallego-Paez LM, Machado D, Gramaça J, Vilchez J, Xavier AT, Ferreira MG, Miranda AR, Mansinho H, Brito MJ, Pacheco TR, Abreu C, Lucia-Costa A, Mansinho A, Fior R, Costa L, Martins M (2022) [Predictive and therapeutic implications of a novel PLCγ1/SHP2-driven mechanism of cetuximab resistance in metastatic colorectal cancer](#). **Clin Cancer Res.** 28(6):1203-1216. DOI: 10.1158/1078-0432.CCR-21-1992

Gordino G, Costa-Pereira S, Corredeira P, Alves P, Costa L, Gomes AQ, Silva-Santos B, Ribot JC (2022) [MicroRNA-181a restricts human γδ T cell differentiation by targeting Map3k2 and Notch2](#). **EMBO Rep.** 23:e52234. DOI: 10.15252/embr.202052234

Silva S, Cavaco A, Basso B, Mota J, Cruz-Duarte R, Costa M, Carvalho L, Lima A, Costa L, Ferreira R, Martins M (2022) [Therapeutic potential of deflamin against colorectal cancer development and progression](#). **Cancers.** 14(24):6182. DOI: 10.3390/cancers14246182

Sobral D, Martins M, Kaplan S, Golkaram M, Salmans M, Khan N, Vijayaraghavan R, Casimiro S, Fernandes A, Borralho P, Ferreira C, Pinto R, Abreu C, Costa AL, Zhang S, Pawlowski T, Godsey J, Mansinho A, Macedo D, Lobo-Martins S, Filipe P, Esteves R, Coutinho J, Costa PM, Ramires A, Aldeia F, Quintela A, So A, Liu L, Grosso AR, Costa L (2022) [Genetic and microenvironmental intra-tumor heterogeneity impacts colorectal cancer evolution and metastatic development](#). **Commun Biol.** 5:937. DOI: 10.1038/s42003-022-03884-x

Lopes-Brás R, Lopez-Presa D, Esperança-Martins M, Melo-Alvim C, Gallego L, Costa L, Fernandes I (2022) [Genomic profiling of sarcomas: A promising weapon in the therapeutic arsenal](#). **Int J Mol Sci.** 23(22):14227. DOI: 10.3390/ijms232214227



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Sérgio de Almeida Lab

Selected Publications:

Sabino JC, Almeida MR, Abreu PL, Ferreira AM, Caldas p, Domingues MM, Santos NC, Azzalin CM, Grosso AR, Almeida SF (2022) [Epigenetic reprogramming by TET enzymes impacts co-transcriptional R-loops](#). **Elife**. 11:e69476. DOI: 10.7554/eLife.69476

Chromatin & epigenetics

We study the crosstalk between DNA damage and gene expression, focusing on the role of chromatin as a communication node, in cellular models of aging and cancer using state-of-the-art genetics, live-cell microscopy and genome-scale tools.

In 2022, we disclosed a novel epigenetic determinant of non-canonical DNA structures that are relevant for the regulation of gene expression programs in stem cells, we developed a genetically-encoded sensor to image those structures, and we filed a patent describing a novel synthetic lethal interaction in cancer cells, which we will further explore as a novel anticancer therapy.



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Mamede de Carvalho Lab

Translational clinical physiology

We study a large area of Neurosciences anchored in developing different interconnected tools to find relevant information from neuromuscular and neuropsychiatry disorders. In particular, markers for early diagnosis, epidemiology, treatment effectiveness, and clinical trials.

In 2022, we have increased our output in the main areas of research, with important contributions regarding the dopaminergic dysfunction in Tourette Syndrome, learning, modulation of the spinal cord and peripheral nerve on direct current stimulation, markers of diagnosis and progression in ALS, respiratory neurophysiology, novel treatments and their impact in hATTR amyloidosis.

Selected Publications:

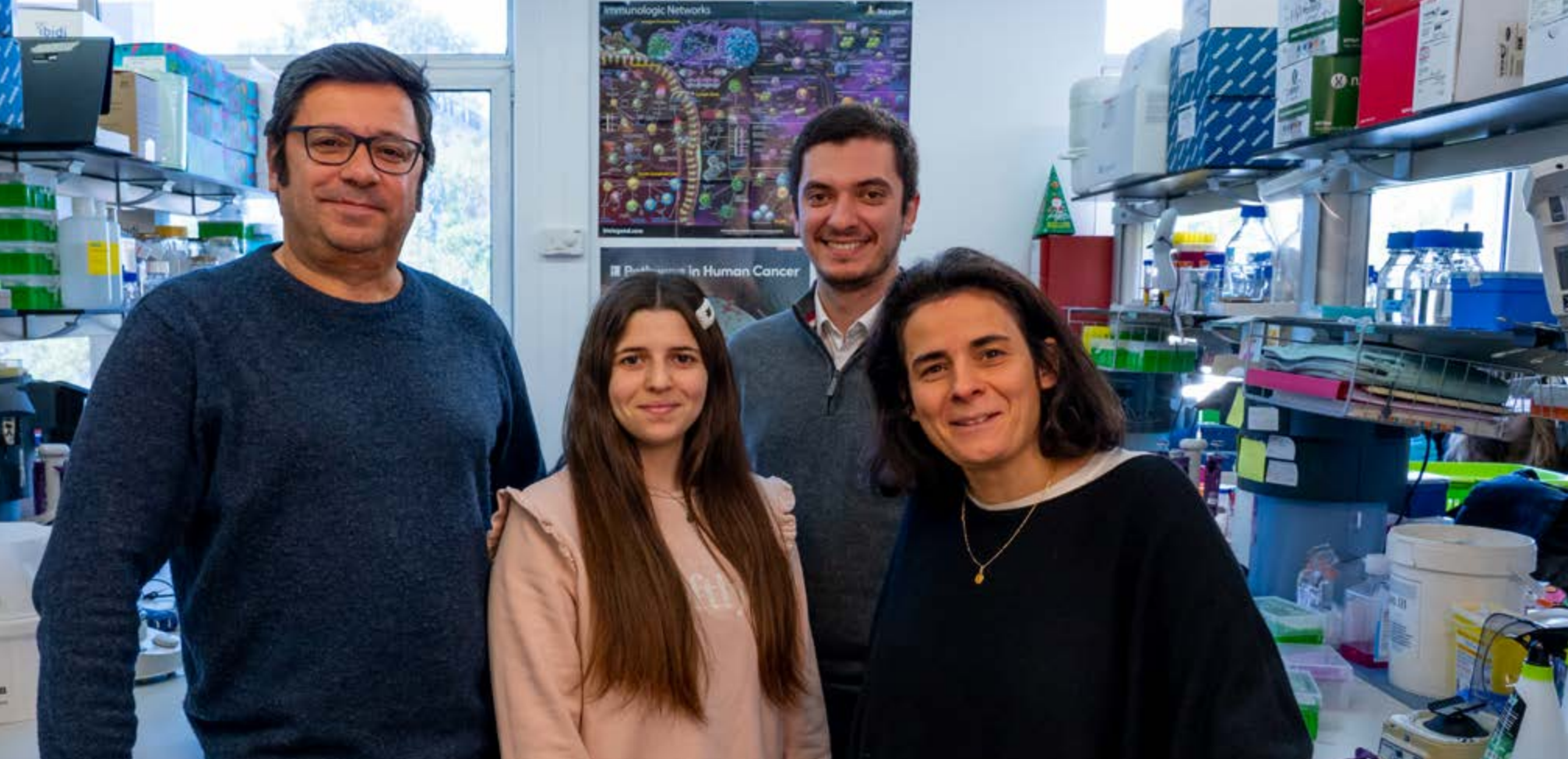
Oliveira Santos M, Domingues S, Gromicho M, Pinto S, de Carvalho M (2022) [Impact of SARS-CoV-2 infection among non-invasive ventilated ALS patients](#). **J Neuromusc Dis**. 9:257-259. DOI: 10.3233/JND-210733

Oliveira Santos M, Schön M, Valadas A, de Carvalho M (2022) [Teaching Video Neurolmage: Disabling jaw clonus in a bulbar-onset ALS patient successfully treated with botulinum toxin](#). **Neurology**. 10:1212. DOI: 10.1212/WNL.0000000000201114

Pereira M, Fernandes SR, Miranda PC, De Carvalho M (2022) [Lumbar trans-spinal direct current stimulation: A modeling-experimental approach to dorsal root ganglia stimulation](#). **Front Neurosc**. 16:1041932. DOI: 10.3389/fnins.2022.1041932.

Pinto S, Gromicho M, Oliveira Santos M, Swash M, de Carvalho M (2022) [Respiratory onset in Amyotrophic Lateral Sclerosis: clinical features and spreading pattern](#). **Amyotr Lat Scler Frontotemporal Degener**. (1-2):40-44. DOI: 10.1080/21678421.2022.2067777

Soares DF, Henriques R, Gromicho M, de Carvalho M, Madeira SC (2022) [Learning prognostic models using a mixture of biclustering and triclustering: Predicting the need for non-invasive ventilation in Amyotrophic Lateral Sclerosis](#). **J Biomed Inform**. 134:104172. DOI: 10.1016/j.jbi.2022.104172



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Sérgio Dias Lab

Vascular biology & cancer microenvironment

We study cancer as a systemic disease. We want to understand how cancers communicate with their “hosts”. We study the role of blood vessels and metabolism in cancer onset and progression. In 2022, we established a new line of research focused on cancer metabolism, and we developed a project on breast cancer mitochondrial metabolism.

Selected Publications:

Esperança-Martins M, F Duarte I, Rodrigues M, Soares do Brito J, López-Presa D, Costa L, Fernandes I, Dias S (2022) [On the relevance of soft tissue sarcomas metabolic landscape mapping](#). *Int J Mol Sci.* 23:11430. DOI: 10.3390/ijms231911430

Magalhaes A, Cesário V, Coutinho D, Matias I, Domingues G, Pinheiro C, Serafim T, Dias S (2022) [Hypercholesterolemia promotes the intravasation of breast tumor cells through an LDL-LDLR axis](#). *Research Square*. DOI: 10.21203/rs.3.rs-1760715/v1

Nobrega-Pereira S, Serafim T, Lopes AP, Santos M, Carvalho F, de Jesus BB, Morais V, Dias S (2022) [Mitochondrial metabolism drives hypercholesterolemia-induced breast cancer cell migration](#). *Research Square*. DOI: 10.21203/rs.3.rs-1338648/v1



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Ana Espada de Sousa Lab

Human immunodeficiency & immune reconstitution

We study immune regulation and human T-cell homeostasis in health and human disease with the ultimate goal of identifying new strategies for immune reconstitution and targets for immune-based therapies. We prioritise the “bedside to the bench” approach and, bringing together physicians and clinical researchers, from different medical areas, and basic researchers. In 2022, we studied large cohorts of patients with immunodeficiency to help decipher the complex interplay of persistent infections and immune dysregulation. Our central question was how naive T cells are maintained throughout life, ensuring immune-competence.

Selected Publications:

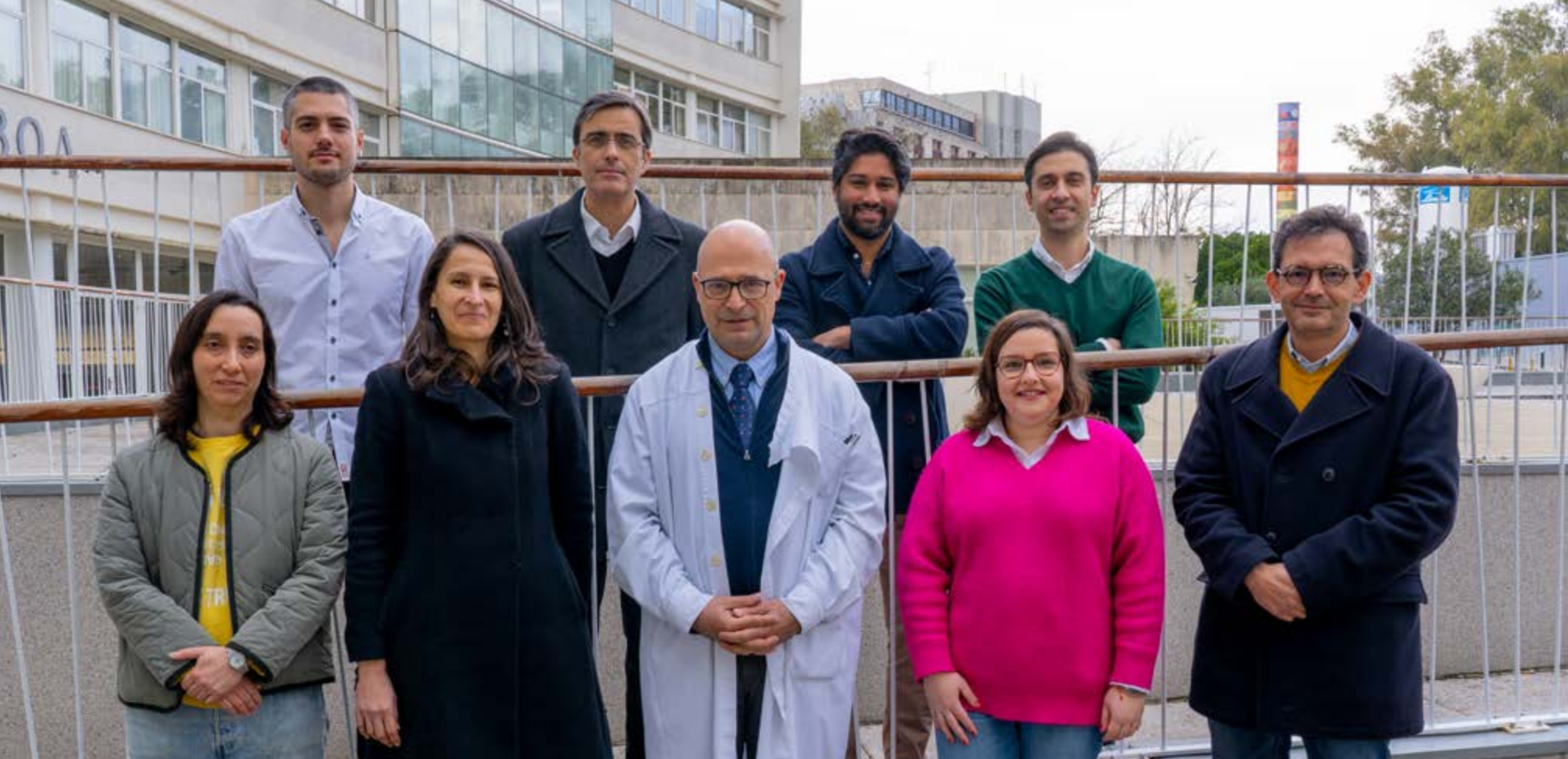
Gomes AMC, Farias GB, Trombetta AC, Godinho-Santos A, Parreira I, Gonçalves HD, Simões ML, Aguiar P, Devezza MM, Inácio J, Sousa AE, da Silva SL (2022) [Phenotype of BTK-lacking myeloid cells during prolonged COVID-19 and upon convalescent plasma](#). **Eur J Haematol.**1-4. DOI: 10.1111/ejh.13881

Motta-Raymundo A, Rosmaninho P, Santos DF, Ferreira RD, Silva SP, Ferreira C, Sousa AE, Silva SL (2022) [Contribution of Helicobacter pylori to the inflammatory complications of common variable immunodeficiency](#). **Front Immunol.** 13:834137. DOI: 10.3389/fimmu.2022.834137

Nunes-Cabaço H, Ramalho-Dos-Santos A, Pires AR, Martins LR, Barata JT, Sousa AE (2022) [Human CD4 T cells from thymus and cord blood are convertible into CD8 T cells by IL-4](#). **Front Immunol.** 13:834033. DOI: 10.3389/fimmu.2022.834033

Passos V, Pires AR, Foxall RB, Nunes-Cabaço H, Sousa AE (2022) [Expression of human endogenous retroviruses in the human thymus along T cell development](#). **Front. Virol.** 2:826393. DOI: 10.3389/fviro.2022.826393

Ribeiro F, Romão VC, Rosa S, Jesus K, Água-Doce A, Barreira SC, Martins P, da Silva SL, Nobre E, Bugalho MJ, Fonseca VR, Eurico Fonseca J, Graca L (2022) [Different antibody-associated autoimmune diseases have distinct patterns of T follicular cell dysregulation](#). **Sci Rep.** 12(1):17638. DOI: 10.1038/s41598-022-21576-8



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Joaquim Ferreira Lab

Clinical pharmacology

We study new therapeutic interventions, mainly neurodegenerative diseases, pediatric, and rare diseases. In 2022, we participated in the design and conduction of a clinical trial evaluating the effect of an iron chelator in early Parkinson's disease, and we presented important results on the cognitive and psychiatric characteristics of late stage Parkinson's disease patients.

Selected Publications:

Devos D, Labreuche J, Rascol O, Corvol JC, Duhamel A, Guyon Delannoy P, Poewe W, Compta Y, Pavese N, Růžička E, Dušek P, Post B, Bloem BR, Berg D, Maetzler W, Otto M, Habert MO, Lehericy S, Ferreira J, Dodel R, Tranchant C, Eusebio A, Thobois S, Marques AR, Meissner WG, Ory-Magne F, Walter U, de Bie RMA, Gago M, Vilas D, Kulisevsky J, Januario C, Coelho MVS, Behnke S, Worth P, Seppi K, Ouk T, Potey C, Leclercq C, Viard R, Kuchcinski G, Lopes R, Pruvo JP, Pigny P, Garçon G, Simonin O, Carpentier J, Rolland AS, Nyholm D, Scherfler C, Mangin JF, Chupin M, Bordet R, Dexter DT, Fradette C, Spino M, Tricta F, Ayton S, Bush AI, Devedjian JC, Duce JA, Cabantchik I, Defebvre L, Deplanque D, Moreau C; FAIRPARK-II Study Group (2022) [Trial of Deferiprone in Parkinson's Disease. N Engl J Med.](#) 387(22):2045-2055. DOI: 10.1056/NEJMoa2209254

Gates M, Gates A, Pieper D, Fernandes RM, Tricco AC, Moher D, Brennan SE, Li T, Pollock M, Lunny C, Sepúlveda D, McKenzie JE, Scott SD, Robinson KA, Matthias K, Bougioukas KI, Fusar-Poli P, Whiting P, Moss SJ, Hartling L (2022) [Reporting guideline for overviews of reviews of healthcare interventions: development of the PRIOR statement. BMJ.](#) 378:e070849. DOI: 10.1136/bmj-2022-070849

Ferreira JJ, Poewe W, Rascol O, Stocchi F, Antonini A, Moreira J, Guimarães B, Rocha JF, Soares-da-Silva P (2022) [Effect of Opicapone on Levodopa pharmacokinetics in patients with fluctuating Parkinson's Disease. Mov Disord.](#) 37(11):2272-2283. DOI: 10.1002/mds.29193

Ferreira JJ, Rodrigues FB, Duarte GS, Mestre TA, Bachoud-Levi AC, Bentivoglio AR, Burgunder JM, Cardoso F, Claassen DO, Landwehrmeyer GB, Kulisevsky J, Nirenberg MJ, Rosser A, Roth J, Seppi K, Slawek J, Furr-Stimming E, Tabrizi SJ, Walker FO, Vandenberghe W, Costa J, Sampaio C (2022) [An MDS Evidence-Based Review on Treatments for Huntington's Disease. Mov Disord.](#) 37(1):25-35. DOI: 10.1002/mds.28855



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Luísa Figueiredo Lab

Biology of parasitism

We are interested in understanding the disease mechanisms caused by African trypanosomes, the parasites responsible for a fatal disease in humans (sleeping sickness) and a chronic disease in cattle (nagana). In 2022, we published two important discoveries: RNA poly(A) tails harbor RNA modifications and long non coding RNAs trigger cell differentiation in African trypanosomes. We also published a novel mouse model to study cerebral animal trypanomiasis. Three students brilliantly concluded their graduate studies and defended their PhD work.

Selected Publications:

De Niz M, Figueiredo LM (2022) [Surgical and intravital microscopy protocol to image Trypanosoma brucei-host interactions in live rodent models](#). **STAR Protoc.** 3(2):101450. DOI: 10.1016/j.xpro.2022.101450

Guegan F, Rajan KS, Bento F, Pinto-Neves D, Sequeira M, Gumińska N, Mroczek S, Dziembowski A, Cohen-Chalamish S, Doniger T, Galili B, Estévez AM, Notredame C, Michaeli S, Figueiredo LM (2022) [A long non-coding RNA controls parasite differentiation in African trypanosomes](#). **Sci Adv.** 8(24):eabn2706. DOI: 10.1126/sciadv.abn2706

Silva Pereira S, De Niz M, Serre K, Ouarné M, Coelho JE, Franco CA, Figueiredo LM (2022) [Immunopathology and Trypanosoma congolense parasite sequestration cause acute cerebral trypanosomiasis](#). **eLife.** 11:e77440. DOI: 10.7554/eLife.77440

Trindade S, De Niz M, Costa-Sequeira M, Bizarra-Rebelo T, Bento F, Dejung M, Narciso MV, López-Escobar L, Ferreira J, Butter F, Bringaud F, Gjini E, Figueiredo LM (2022) [Slow growing behavior in African trypanosomes during adipose tissue colonization](#). **Nat Commun.** 13(1):7548. DOI: 10.1038/s41467-022-34622-w

Viegas IJ, de Macedo JP, Serra L, De Niz M, Temporão A, Silva Pereira S, Mirza AH, Bergstrom E, Rodrigues JA, Aresta-Branco F, Jaffrey SR, Figueiredo LM (2022) [N6-methyladenosine in poly\(A\) tails stabilize VSG transcripts](#). **Nature.** 604(7905):362-370. DOI: 10.1038/s41586-022-04544-0



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Paulo Filipe Lab

Dermatology, skin biology and pathology

We study immune responses in skin cancer. We are interested in discovering biomarkers of therapeutic response and disease recurrence, and in implementing methodologies that provide useful readouts of the efficacy of targeted therapies. In 2022, we completed the characterization of the immune cell infiltrates of a large number of human epithelial skin cancers, and we have found that Vemurafenib, a drug used in the treatment of skin cancer, induces phototoxicity and facilitates organelle damage induced by UV light.

Selected Publications:

Alpalhão M, Duarte J, Diogo R, Vandemeulebroecke M, Ortmann CE, Kasperek T, Filipe P (2022) [Lower limbs are the most difficult-to-treat body region of patients with Psoriasis: Pooled analysis of CLEAR and CLARITY studies of Secukinumab versus Ustekinumab by body region.](#) **BioDrugs.** 36(6):781-789. DOI: 10.1007/s40259-022-00558-2

Alpalhão M, Sousa D, Frade JV, Patrocínio J, Garrido PM, Correia C, Brazão C, Mancha D, Nuncio MS, Carvalho IL, Pelerito A, Borrego MJ, Filipe P (2022) [Human Immunodeficiency Virus infection may be a contributing factor to Monkeypox infection: analysis of a 42-case series.](#) **J Am Acad Dermatol.** S0190-9622(22)02772-4. DOI: 10.1016/j.jaad.2022.09.029

Brazão C, Garrido PM, Alpalhão M, Roda , Vieitez-Frade J, Ferreira JA, Pelerito A, Carvalho IL, Nuncio MS, Cordeiro R, Borrego MJ, Filipe P (2022) [The Monkeypox virus infection in HIV-1-coinfected patients previously vaccinated against smallpox: a series of 4 cases from Portugal.](#) **J Eur Acad Dermatol Venereol.** 37(3):e319-e321. DOI: 10.1111/jdv.18655

de Sousa D, Frade J, Patrocínio J, Borges-Costa J, Filipe P (2022) [Monkeypox infection and bacterial cellulitis: a complication to look for.](#) **Int J Infect Dis.** 123:180-182. DOI: 10.1016/j.ijid.2022.08.024

Torres T, Paiva-Lopes MJ, Gonçalo M, Claro C, Oliveira M, Gomes J, Vieira AP, Amoedo P, Alpalhão M, Nogueira M, Santiago F, Henrique M, Amaro C, Esteves T, Alves J, Cerejeira D, Mendes-Bastos P, Pestana M, Ramos L, Rocha J, Carvalho R, Teixeira L, Selores M, Mota A, Filipe P; Portuguese Group of Atopic Dermatitis (2022) [Dupilumab for atopic dermatitis: a real-world Portuguese multicentre retrospective study.](#) **J Dermatolog Treat.** 33(5):2554-2559. DOI: 10.1080/09546634.2022.2035309



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João Eurico da Fonseca Lab

Reumatology research

We study inflammatory joint diseases, such as Rheumatoid Arthritis, Juvenile Idiopathic Arthritis, Spondyloarthritis and Systemic Lupus Erythematosus, in order to characterize potential tools for early diagnosis and prognosis and potential targets for novel therapies. In 2022, in between other work, we identified risk factors for infection, predictors of severe disease, and antibody response to COVID-19 in patients with inflammatory rheumatic diseases.

Selected Publications:

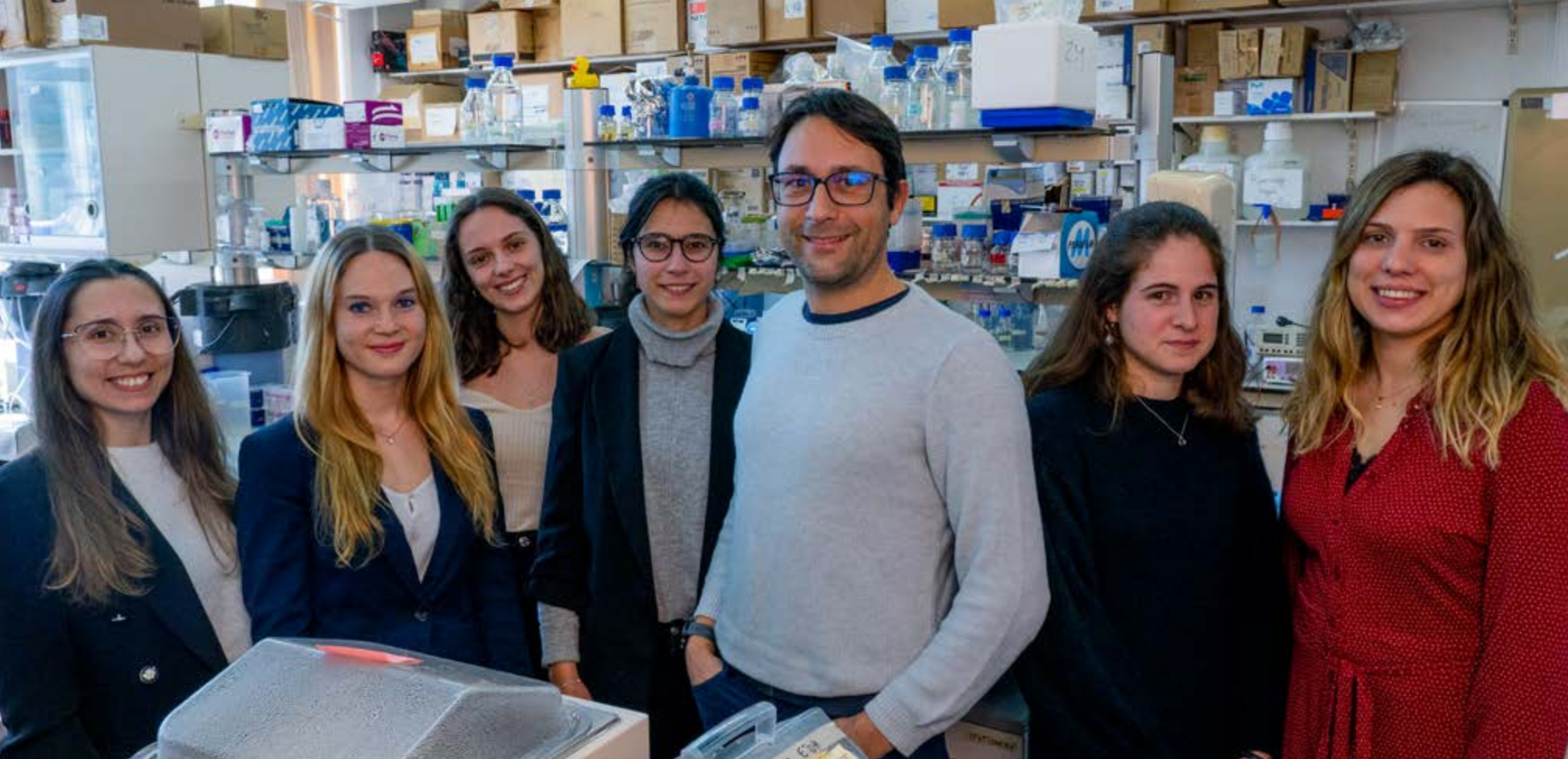
Bandeira M, Vieira A, Guimarães V, Bento T, Amoura Z, Arnaud L, Beretta L, Cere A, Chehab G, Hachulla E, Milas-Ahić J, Müller-Ladner U, Nagy G, Piette Y, Rednic S, Schneider M, Smith V, Cutolo M, Fonseca JE, Romão VC (2022) [Off-label use of mycophenolate mofetil in the treatment of rare and complex rheumatic connective tissue diseases](#). **Clin Exp Rheumatol**. 134(5):32-39. DOI: 10.55563/clinexprheumatol/v1e7s2

Carvalho PD, Vieira-Sousa E, Hmamouchi I, Marreiros A, Machado PM (2022) [Determinants of health-related quality of life in spondyloarthritis and rheumatoid arthritis - data from the COMOSPA and COMORA studies](#). **Semin Arthritis Rheum**. 57:152086. DOI: 10.1016/j.semarthrit.2022.152086.

Cruz-Machado AR, Barreira SC, Bandeira M, Veldhoen M, Gomes A, Serrano M, Duarte C, Rato M, Miguel Fernandes B, Garcia S, Pinheiro F, Bernardes M, Madeira N, Miguel C, Torres R, Bento Silva A, Pestana J, Almeida D, Mazedo C, Cunha Santos F, Pinto P, Sousa M, Parente H, Sequeira G, Santos MJ, Fonseca JE, Romão VC (2022) [Risk factors for infection, predictors of severe disease, and antibody response to COVID-19 in patients with inflammatory rheumatic diseases in Portugal-A multicenter, nationwide study](#). **Front Med**. 9:901817. DOI: 10.3389/fmed.2022.901817.

Ponte C, Grayson PC, Robson JC, Suppiah R, Gribbons KB, Judge A, Craven A, Khalid S, Hutchings A, Watts RA, Merkel PA, Luqmani RA; DCVAS Study Group (2022) [American College of Rheumatology / European League Against Rheumatism Classification Criteria for Giant Cell Arteritis](#). **Ann Rheum Dis**. 81:1647-1653. DOI: 10.1136/ard-2022-223480

Zinterl C, Costa-Reis P, Esteves IC, Marques JG, Sousa AB, Fonseca JE, Oliveira Ramos F (2022) [The added value of a multidisciplinary clinic for systemic autoinflammatory diseases](#). **J Multidiscip Healthc**. 15:999-1010. DOI: 10.2147/JMDH.S351546



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Claúdio Franco Lab

Vascular morphogenesis

We aim to understand the principles governing the formation and function of blood vessels and to integrate these concepts to reveal the aetiology of human vascular disorders. In 2022, we demonstrated that shear stress and VEGFA compete to establish the polarization axis of endothelial cells, and we found a specific splicing signature that correlates with the pre-birth adaptation of the lung to the transition from the embryonic to the neonatal stage.

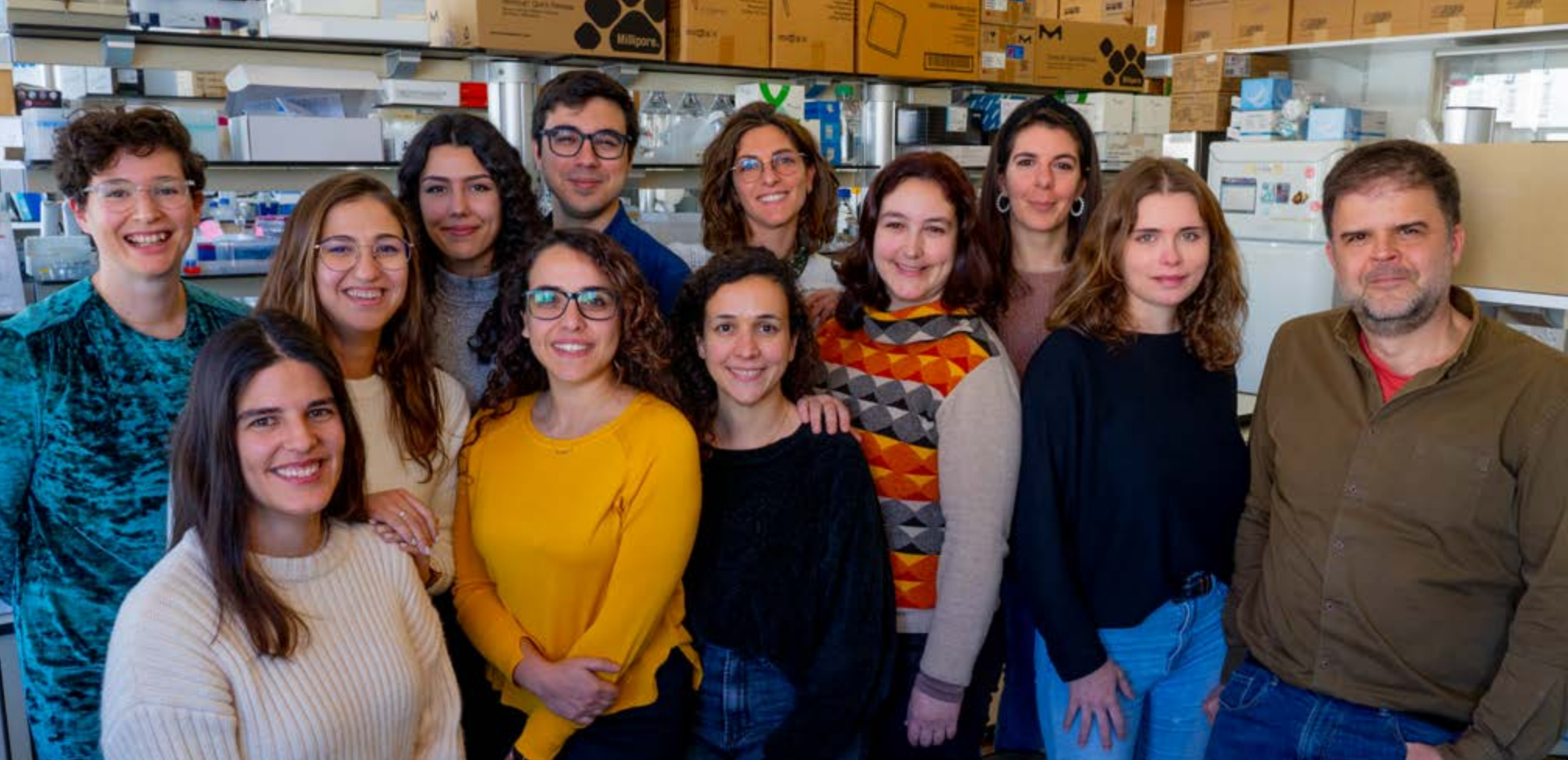
Selected Publications:

Barbacena P, Dominguez-Cejudo M, Fonseca CG, Gómez-González M, Faure LM, Zarkada G, Pena A, Pezzarossa A, Ramalho D, Giarratano Y, Ouarné M, Barata D, Fortunato IC, Misikova LH, Mauldin I, Carvalho Y, Trepas X, Roca-Cusachs P, Eichmann A, Bernabeu MO, Franco CA (2022) [Competition for endothelial cell polarity drives vascular morphogenesis in the mouse retina](#). *Dev Cell*. 57(19):2321–2333. DOI: 10.1016/j.devcel.2022.09.002

Fidalgo MF, Fonseca CG, Caldas P, Raposo AA, Balboni T, Henao-Mišíková L, Grosso AR, Vasconcelos FF, Franco CA (2022) [Aerocyte specification and lung adaptation to breathing is dependent on alternative splicing changes](#). *Life Sci Alliance*. 5(12):e202201554. DOI: 10.26508/lsa.202201554

Janota CS, Pinto A, Pezzarossa A, Machado P, Costa J, Campinho P, Franco CA, Gomes ER (2022) [Shielding of actin by the endoplasmic reticulum impacts nuclear positioning](#). *Nat Commun*. 13(1):2763. DOI: 10.1038/s41467-022-30388-3

Narotamo H, Ouarne M, Franco CA, Silveira M (2022) [Synthetic generation of 3D microscopy images using generative adversarial networks](#). *Annu Int Conf IEEE Eng Med Biol Soc*. 549–552. DOI: 10.1109/EMBC48229.2022.9871631



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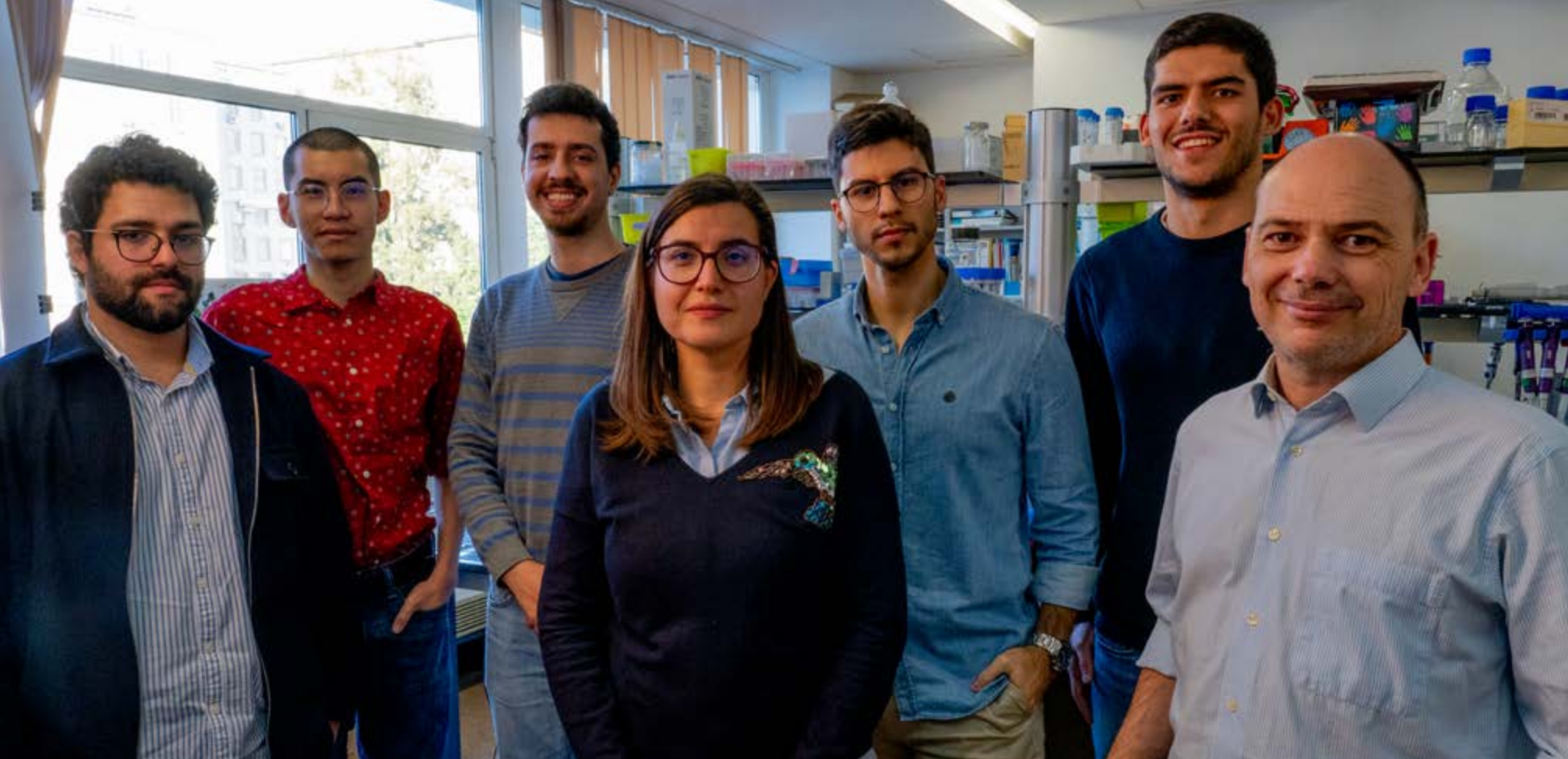
Edgar Gomes Lab

Cell architecture

We study how cells distribute their organelles spatially within a cell. We are interested in understanding the processes involved in the connections between nucleus and cytoplasm and the role for nuclear positioning and organelle organization in cell function in cell migration and skeletal myofiber formation. In 2022, we found that remodeling of endoplasmic reticulum impacts nuclear positioning through the formation of a barrier that shields immobile ventral stress fibers, and we generated novel microdevices to mimic blood vessels with endothelial cells, in combination with motor neurons and myofibers.

Selected Publications:

Janota CS, Pinto A, Pezzarossa A, Machado P, Costa J, Campinho P, Franco CA, Gomes ER (2022) [Shielding of actin by the endoplasmic reticulum impacts nuclear positioning](#). **Nat Commun.** 13(1):2763. DOI: 10.1038/s41467-022-30388-3



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Luís Graça Lab

Lymphocyte regulation

We study mechanisms underlying the regulation of the immune response. In other words, we research methods to alter the balance of the immune response: reducing its action when the immune system is causing a disease, such as allergy, autoimmunity, and transplant rejection; or enhancing the immune response to vaccines, cancer or infection. In 2022, we established the developmental trajectory of T follicular helper cells, under distinct inflammatory environments. A significant part of our effort was devoted to the characterization of population immunity acquired following COVID-19 vaccination and infection.

Selected Publications:

Malato J, Ribeiro RM, Leite PP, Casaca P, Fernandes E, Antunes C, Fonseca VR, Gomes MC, Graca L (2022) [Risk of BA. 5 infection among persons exposed to previous SARS-CoV-2 variants](#). **N Engl J Med.** 387(10):953-954. DOI: 10.1056/NEJMc2209479

Ribeiro F, Romão VC, Rosa S, Jesus K, Água-Doce A, Barreira SC, Martins P, da Silva SL, Nobre E, Bugalho MJ, Fonseca VR, Eurico Fonseca J, Graca L (2022) [Different antibody-associated autoimmune diseases have distinct patterns of T follicular cell dysregulation](#). **Sci. Rep.** 12:17638. DOI: 10.1038/s41598-022-21576-8



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João Lacerda Lab

Hematology & transplantation immunology

We study the immune system in the period that follows Hematopoietic Stem Cell Transplantation, aiming to identify immunological risk factors and mechanisms involved in the most common complications, namely Graft-versus-Host Disease, infection, and malignancy relapse. In 2022, the final results of the Phase I/II clinical trials regarding the safety and efficacy of donor regulatory T cell infusions in patients with chronic Graft-versus-Host Disease demonstrated that this treatment is feasible, safe and potentially effective.

Selected Publications:

Minskaia E, Lacerda JF (2022) [Analysis of FOXP3 DNA methylation patterns to identify functional FOXP3+ T-cell subpopulations](#). **Methods Mol Biol.** 2559. DOI: 10.1007/978-1-0716-2647-4_9



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Luísa Lopes Lab

Neurobiology of aging & disease

We study the mechanisms inducing the “early-aging” of cognitive function, focusing on hippocampal circuitry and related behavior in rodent models. We aim to create better translational aging models, through the use of age-equivalent human-derived neurons. In 2022, we secured competitive international and national funding for the upcoming research projects, and we published a commentary stemming from our work that supports a prime role for adenosine during brain adaptation to challenges and emphasizes our contribution to this important physiological mechanism.

Selected Publications:

Rajão-Saraiva J, Temido-Ferreira M, Coelho JE, Ribera A, Moreno S, Willem M, Marie H, Lopes LV, Pousinha PA (2022) [Age-dependent NMDA receptor function is regulated by the Amyloid Precursor Protein](#). **bioRxiv**. 07.20.500736. DOI: 10.1101/2022.07.20.500736



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Nuno Morais Lab

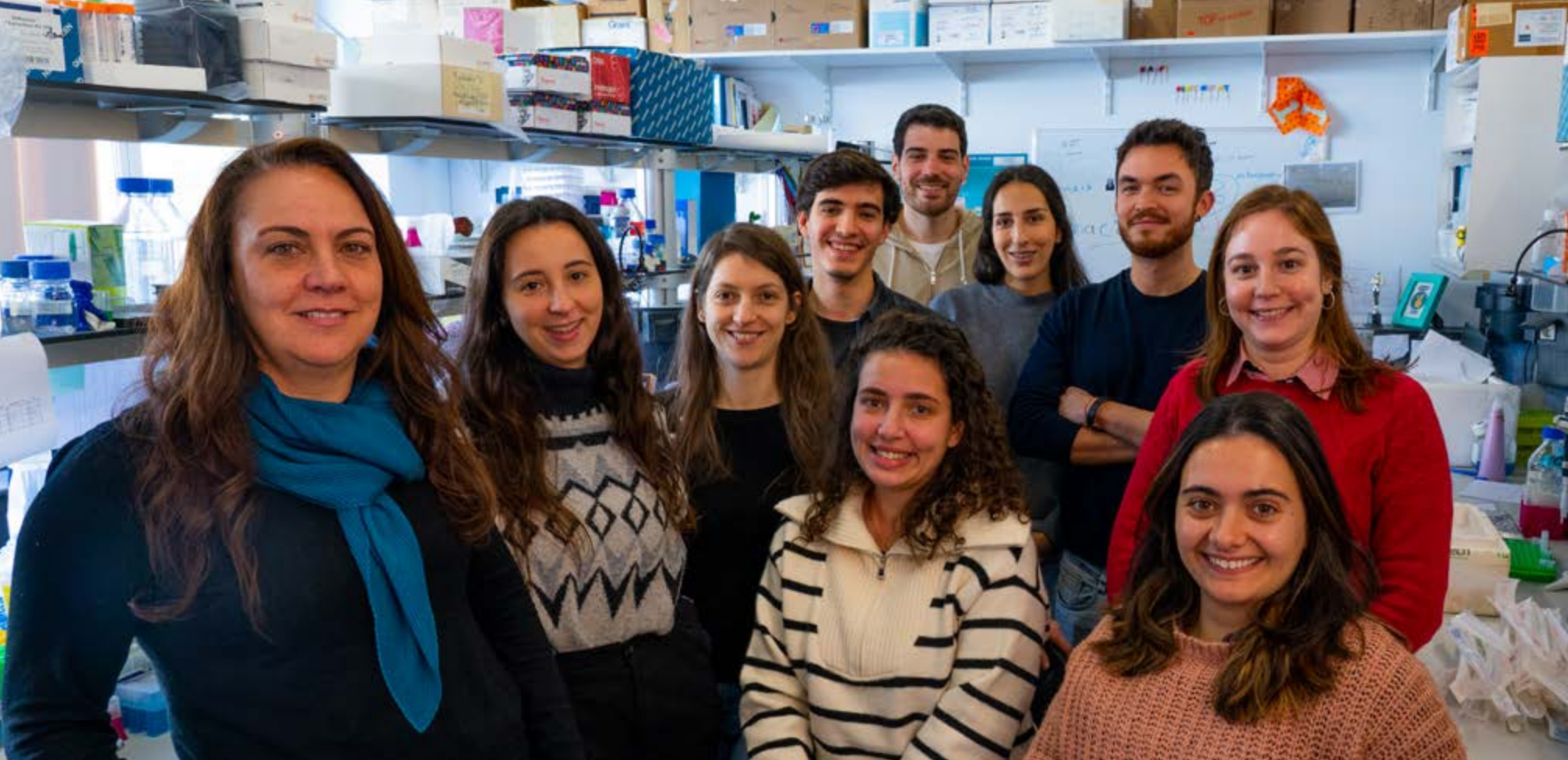
Disease Transcriptomics

We study how changes at the RNA-level in (mostly) human tissues increase proneness to diseases, namely cancer, neurodegenerative disorders and other aging-related pathologies, by developing and using computational biology approaches for the analysis of transcriptomic data. In 2022, we completed the development of new bioinformatics web applications: betAS, for visual and intuitive analysis of differential alternative splicing from RNA-seq read count data; and voyAGER, for visual and statistical exploration of human sex and tissue-specific gene expression changes with age.

Selected Publications:

Ascensão-Ferreira M, Saraiva-Agostinho N, Barbosa-Morais NL (2022) [betAS: intuitive analysis and visualisation of differential alternative splicing using beta distributions](#). **bioRxiv**. 12.26.521935. DOI: 10.1101/2022.12.26.521935

Schneider AL, Saraiva-Agostinho N, Barbosa-Morais NL (2022) [voyAGER: free web interface for the analysis of age-related gene expression alterations in human tissues](#). **bioRxiv**. 12.22.521681. DOI: 10.1101/2022.12.22.521681



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Vanessa Morais Lab

Mitochondria biology & neurodegeneration

We study the intrinsic properties of synaptic mitochondria and scrutinize their relevance for the diseased brain. We aim to clarify the crosstalk between the host cell – the neuron – and the powerhouse organelle – the mitochondria. In 2022, we focused on the PINK1-mediated mitochondrial quality control processes and crosstalk between different neural types; we observed that modulating mitochondrial dynamics can be a powerful approach to regulate neural stem cell fate; and we developed an algorithm for variant level determination specific for mitochondrial DNA genome.

Selected Publications:

Faria-Pereira A, Temido-Ferreira M, Morais, VA (2022) [BrainPhys neuronal media supports physiological function of mitochondria in mouse primary neuronal cultures](#). **Front Mol Neurosci.** 15:1-12. DOI: 10.3389/fnmol.2022.837448

Konjar Š, Ferreira C, Carvalho FS, Figueiredo-Campos P, Fanczal J, Ribeiro S, Morais VA, Veldhoen M (2022) [Intestinal tissue-resident T cell activation depends on metabolite availability](#). **Proc Natl Acad Sci USA.** 119(34):e2202144119. DOI: 10.1073/pnas.2202144119



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Maria Mota Lab

Biology & physiology of malaria

We study the biology of *Plasmodium*, the causative agent of malaria, a fascinating organism that lives a parasitic life style between *Anopheles* mosquitoes and a high variety of vertebrates. We pursue two long-lasting questions: what is special about the liver that allows *Plasmodium* to achieve an extraordinary rate of replication?, and why do people die of malaria?

In 2022, we added two pieces to the collection of host-*Plasmodium* interactions describing mechanisms that aid parasite survival and allow the parasite to escape hostile host response; we provided a comprehensive single-cell gene profiling of hepatocytes and parasites over time with the Itzkovitz Lab; and we added host microbiota as a third party determining disease.

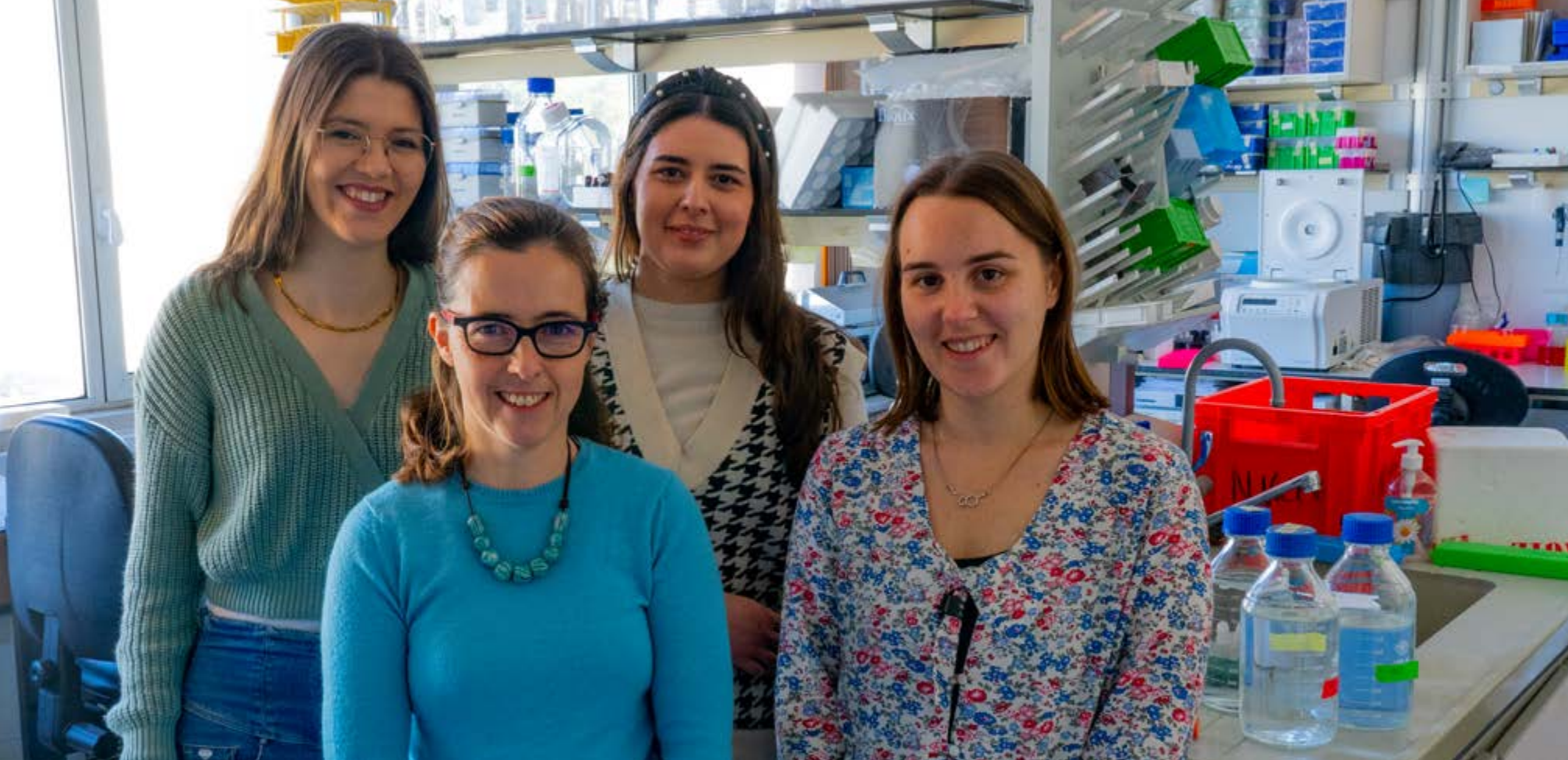
Selected Publications:

Afriat A, Zuzarte-Luís V, Bahar Halpern K, Buchauer L, Marques S, Chora F, Lahree A, Amit I, Mota MM, Itzkovitz S (2022) [A spatiotemporally resolved single-cell atlas of the Plasmodium liver stage](#). **Nature**. 611(7936):563–569. DOI: 10.1038/s41586-022-05406-5

Lahree A, Baptista SJS, Marques S, Perschin V, Zuzarte-Luís V, Goel M, Choudhary HH, Mishra S, Stigloher C, Zerial M, Sundaramurthy V, Mota MM (2022) [Active APPL1 sequestration by Plasmodium favors liver-stage development](#). **Cell Rep**. 39(9):110886. DOI: 10.1016/j.celrep.2022.110886

M'Bana V, Lahree A, Marques S, Slavic K, Mota MM (2022) [Plasmodium parasitophorous vacuole membrane-resident protein UIS4 manipulates host cell actin to avoid parasite elimination](#). **iScience**. 25(5):104281. DOI: 10.1016/j.isci.2022.104281

Mukherjee D, Chora F, Lone JC, Ramiro RS, Blankenhaus B, Serre K, Ramirez M, Gordo I, Veldhoen M, Varga-Weisz P, Mota MM (2022) [Host lung microbiota promotes malaria-associated acute respiratory distress syndrome](#). **Nat Commun**. 13(1):3747. DOI: 10.1038/s41467-022-31301-8



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Joana Neves Lab

Aging & tissue repair

We are interested in harnessing the potential of tissue repair to promote organ rejuvenation. We use skeletal muscle regeneration as a paradigm of tissue repair to understand the molecular and cellular basis of the immune modulatory component of tissue regeneration and how its dysregulation in aging and disease can be targeted to optimize stem cell-based therapies. In 2022, we followed up on our discoveries of a fundamental role for MANF in the regulation of the immune response during tissue repair, and a central role of age-related immune dysfunction in regenerative decline.

Selected Publications:

Sousa NS, Brás MF, Antunes IB, Lindholm P, Neves J, Sousa-Victor P (2022) [Ageing disrupts MANF-mediated immune modulation during skeletal muscle regeneration](#). **bioRxiv**. DOI: 10.1101/2022.07.20.500588



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Miguel Prudêncio Lab

Plasmodium infection & anti-malarial interventions

We study infection by *Plasmodium* parasites, the causative agents of malaria. In 2022, we described the potential of drugs, alone or in combination, with antiplasmodial activity, we assessed the impact of diet in the efficacy of vaccination against malaria, and we established the pre-clinical proof-of-concept of a novel strategy for vaccination against malaria.

Selected Publications:

Fontinha D, Arez F, Gal IR, Nogueira G, Moita D, Baeurle THH, Brito C, Spangenberg T, Alves PM, Prudêncio M (2022) [Pre-erythrocytic activity of M5717 in monotherapy and combination in preclinical Plasmodium infection models](#). **ACS Inf. Dis.** 8:721-727. DOI: 10.1021/acsinfecdis.1c00640

Moita D, Maia TG, Duarte M, Andrade CM, Albuquerque IS, Dwivedi A, Silva JC, González-Céron L, Janse CJ, Mendes AM, Prudêncio M (2022) [A genetically modified Plasmodium berghei parasite as a surrogate for whole-sporozoite vaccination against P. vivax malaria](#). **NPJ Vaccines**. DOI: 10.1038/s41541-022-00585-8

Nunes-Cabaço H, Moita D, Rôla C, Mendes AM, Prudêncio M (2022) [Impact of dietary protein restriction on the immunogenicity and efficacy of whole-sporozoite malaria vaccination](#). **Front. Immunol.** 13:869757. DOI: 10.3389/fimmu.2022.869757



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Mário Ramirez Lab

Molecular microbiology & infection

We study the dynamics of populations of bacterial pathogens and how they respond to selective forces. We focus on the effect of antimicrobial use, human vaccination and host diversity on bacterial populations. A strong bioinformatics effort in microbial genomics, microbial typing, data sharing, data analysis and visualization tools is ongoing. In 2022, we created and further developed tools for different applications in metagenomics, and we documented a high sustained number of cases of *Streptococcus pneumoniae* complicated pneumonia among vaccinated children.

Selected Publications:

Friães A, Mamede R, Ferreira M, Melo-Cristino J, Ramirez M (2022) [Annotated whole-genome multilocus sequence typing schema for scalable high-resolution typing of *Streptococcus pyogenes*](#). *J Clin Microbiol*. 60:e0031522. DOI: 10.1128/jcm.00315-22

Kalkman LC, Hanscheid T, Krishna S, Kremsner PG, Grobusch MP (2022) [Antimalarial treatment in infants](#). *Expert Opin Pharmacother*. 23:1711-1726. DOI: 10.1080/14656566.2022.2130687

Martins ER, Nascimento do Ó D, Marques Costa AL, Melo-Cristino J, Ramirez M (2022) [Characteristics of *Streptococcus agalactiae* colonizing nonpregnant adults support the opportunistic nature of invasive infections](#). *Microbiol Spectr*. 10:e0108222. DOI: 10.1128/spectrum.01082-22

Mendes CI, Vila-Cerqueira P, Motro Y, Moran-Gilad J, Carriço JA, Ramirez M (2022) LMAS: [Evaluating metagenomic short de novo assembly methods through defined communities](#). *Gigascience*. 12:giac122. DOI: 10.1093/gigascience/giac122

Silva-Costa C, Gomes-Silva J, Pinho MD, Friães A, Ramirez M, Melo-Cristino J (2022) [Continued vaccine breakthrough cases of serotype 3 complicated pneumonia in vaccinated children, Portugal \(2016-2019\)](#). *Microbiol Spectr*. 10(4):e0107722. DOI: 10.1128/spectrum.01077-22



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Miguel Remondes Lab

Neural mechanisms of perception, memory & decision

We study the connections between the hippocampus and the medial mesocortex, responsible for mediating spatial cognition with adaptive behavior. Such neural circuit is affected in Autism Spectrum Disorders, and is a possible therapeutic entry point we are currently investigating.

In 2022, we established an experimental setup to record and analyze neural activity in rodents, tested a protocol to entrain the activity of neural circuits to controlled external stimuli, in order to attempt to correct aberrant brain rhythms.

Selected Publications:

Oliveira GA, Remondes M, Garcia-Marques T (2022) [Bad after bad is good: Previous trial disfluency reduces interference promoted by incongruence](#). **Psychol Res.** 86(7):2215-2224. DOI: 10.1007/s00426-021-01626-y



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Nuno Santos Lab

Biomembranes & nanomedicine

We study biochemical and biophysical processes occurring in membranes of human cells, as well as of their viral, fungal and bacterial pathogens. In 2022, the work with SARS-CoV-2 has been one of our focus, namely as a response to the private sector's need to test different new strategies to fight the pandemic; we studied key differences between dengue, Zika and West Nile viruses, with a special focus on viral assembly; and we made further advances on the role of the interaction of fibrinogen with erythrocytes and its relevance as a determinant for cardiovascular risk. Aiming at new strategies to tackle multi-resistant pathogens, we studied the molecular-level determinants of the selectivity and activity of antimicrobial peptides.

Selected Publications:

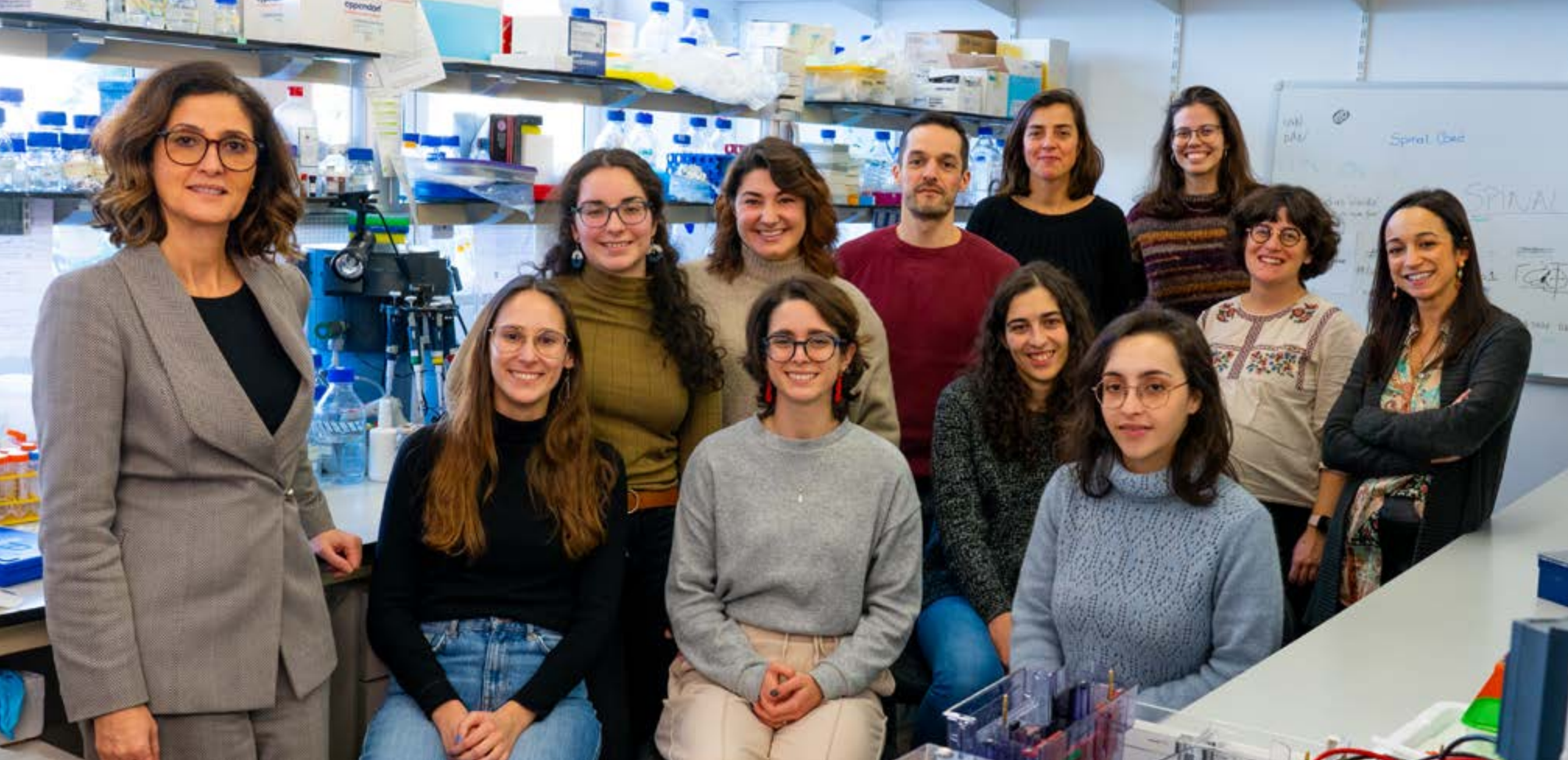
Domingues MM, Carvalho FA, Santos NC. (2022) [Nanomechanics of blood clot and thrombus formation](#). *Annu Rev Biophys*. 51:201-221. DOI: 10.1146/annurev-biophys-111821-072110

Gonçalves S, Martins IC, Santos NC (2022) [Nanoparticle-peptide conjugates for bacterial detection and neutralization: Potential applications in diagnostics and therapy](#). *Wiley Interdiscip Rev Nanomed Nanobiotechnol*. 14(6):e1819. DOI: 10.1002/wnan.1819.

Marques MC, Lousa D, Silva PM, Faustino AF, Soares CM, Santos NC (2022) [The importance of lipid conjugation on anti-fusion peptides against Nipah virus](#). *Biomedicines*. 10:703. DOI: 10.3390/biomedicines10030703

Silva PM, da Silva IV, Sarmento MJ, Silva ÍC, Carvalho FA, Soveral G, Santos NC (2022) [Aquaporin-3 and Aquaporin-5 facilitate migration and cell-cell adhesion in pancreatic cancer by modulating cell biomechanical properties](#). *Cells*. 11(8):1308. DOI: 10.3390/cells11081308

Tomás AL, Reichel A, Silva PM, Silva PG, Pinto J, Calado I, Campos J, Silva I, Machado V, Laranjeira R, Abreu P, Mendes P, Sedrine NB, Santos NC (2022) [UV-C irradiation-based inactivation of SARS-CoV-2 in contaminated porous and non-porous surfaces](#). *J Photochem Photobiol B*. 234:112531. DOI: 10.1016/j.jphotobiol.2022.112531



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Leonor Saúde Lab

Spinal cord regeneration & tissue microenvironment

We study the molecular and cellular mechanisms controlling fundamental regenerative processes activated in the context of a spinal cord injury.

In 2022, we were awarded a Breakthrough Idea Grant from IMM to start a new line of research to explore if different telomere elongation mechanisms exist in regenerating spinal cords, and exploratory projects on different aspects of inflammation in the context of spinal cord injury were granted to two of our postdocs on their way to independence.

Selected Publications:

de Sena-Tomás C, Aleman AG, Ford C, Varshney A, Yao D, Harrington JK, Saúde L, Ramialison M, Targoff KL (2022) [Activation of Nkx2.5 transcriptional program is required for adult myocardial repair](#). **Nat Comm.** 13(1):2970. DOI: 10.1038/s41467-022-30468-4

Frederico B, Martins I, Chapela D, Gasparrini F, Chakravarty, P, Ackels T, Piot C, Almeida B, Carvalho J, Ciccarelli A, Peddie CJ, Rogers N, Briscoe J, Guillemot F, Schäfer AT, Saúde L, Reis e Sousa C (2022) [DNGR-1-tracing marks an ependymal cell subset with damage-responsive neural stem cell potential](#). **Dev Cell.** DOI: 10.1016/j.devcel.2022.07.012

Ribeiro A, Rebocho da Costa M, de Sena-Tomás C, Rodrigues EC, Quitéria R, Maçarico T, Santos SCR, Saúde L (2022) [New functional vessels form after spinal cord injury in zebrafish](#). **BioRxiv.** DOI: 10.1101/2022.06.09.495446



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Ana Sebastião Lab

Neuronal communication & synaptopathies

We aim to elucidate how the neuronal and glial components of the tripartite synapse are fine-tuned under normal and dysfunctional situations. In 2022, we used animal and cellular models to pursue the identification of novel putative targets/mechanisms/biomarkers of brain diseases such as Alzheimer's disease, epilepsy, and depression. We developed strategies to allow 3D astrocytic cultures in paper-based chips and explore the use of nanoparticles for neuroprotection.

Selected Publications:

Ferreira CB, Marttinen M, Coelho JE, Paldanius KMA, Takalo M, Mäkinen P, Leppänen L, Miranda-Lourenço C, Fonseca-Gomes J, Tanqueiro SR, Vaz SH, Belo RF, Sebastião AM, Leinonen V, Soininen H, Pike I, Haapasalo A, Lopes LV, de Mendonça A, Diógenes MJ, Hiltunen M (2022) [S327 phosphorylation of the presynaptic protein SEPTIN5 increases in the early stages of neurofibrillary pathology and alters the functionality of SEPTIN5](#). **Neurobiol Dis.** 163:105603. DOI: 10.1016/j.nbd.2021.105603

Farinha-Ferreira M, Rei N, Fonseca-Gomes J, Miranda-Lourenço C, Serrão P, Vaz SH, Gomes JI, Martins V, de Alves Pereira B, Sebastião AM (2022) [Unexpected short- and long-term effects of chronic adolescent HU-210 exposure on emotional behavior](#). **Neuropharmacology.** 214:109155. DOI: 10.1016/j.neuropharm.2022.109155

Rei N, Valente CA, Vaz SH, Farinha-Ferreira M, Ribeiro JA, Sebastião AM (2022) [Changes in adenosine receptors and neurotrophic factors in the SOD1G93A mouse model of amyotrophic lateral sclerosis: modulation by chronic caffeine](#). **PLoS One.** 17(12):e0272104. DOI: 10.1371/journal.pone.0272104

Savchak OK, Wang N, Ramos-Docampo MA, de Dios Andres P, Sebastião AM, Ribeiro FF, Armada-Moreira A, Städler B, Vaz SH (2022) [Manganese dioxide nanosheet-containing reactors as antioxidant support for neuroblastoma cells](#). **J Mater Chem B.** 10(24):4672-4683. DOI: 10.1039/d2tb00393g

Van Zeller M, Sebastião AM, Valente CA (2022) [Microglia depletion from primary glial cultures enables to accurately address the immune response of astrocytes](#). **Biomolecules.** 12:666. DOI: 10.3390/biom12050666



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Bruno Silva-Santos Lab

Immuno-biology & immuno-oncology

We study how white blood cells are generated and how they mount immune responses against infections and tumors, while also contributing to the normal functions of the tissues they often live in. In a more recent area of research in our lab – neuroimmunology – we study the crosstalk between a type of white blood cells that populate the brain meninges, and the brain.

In 2022, we advanced our knowledge and increased the application of the cellular therapy developed in our laboratory, Delta One T cells.

Selected Publications:

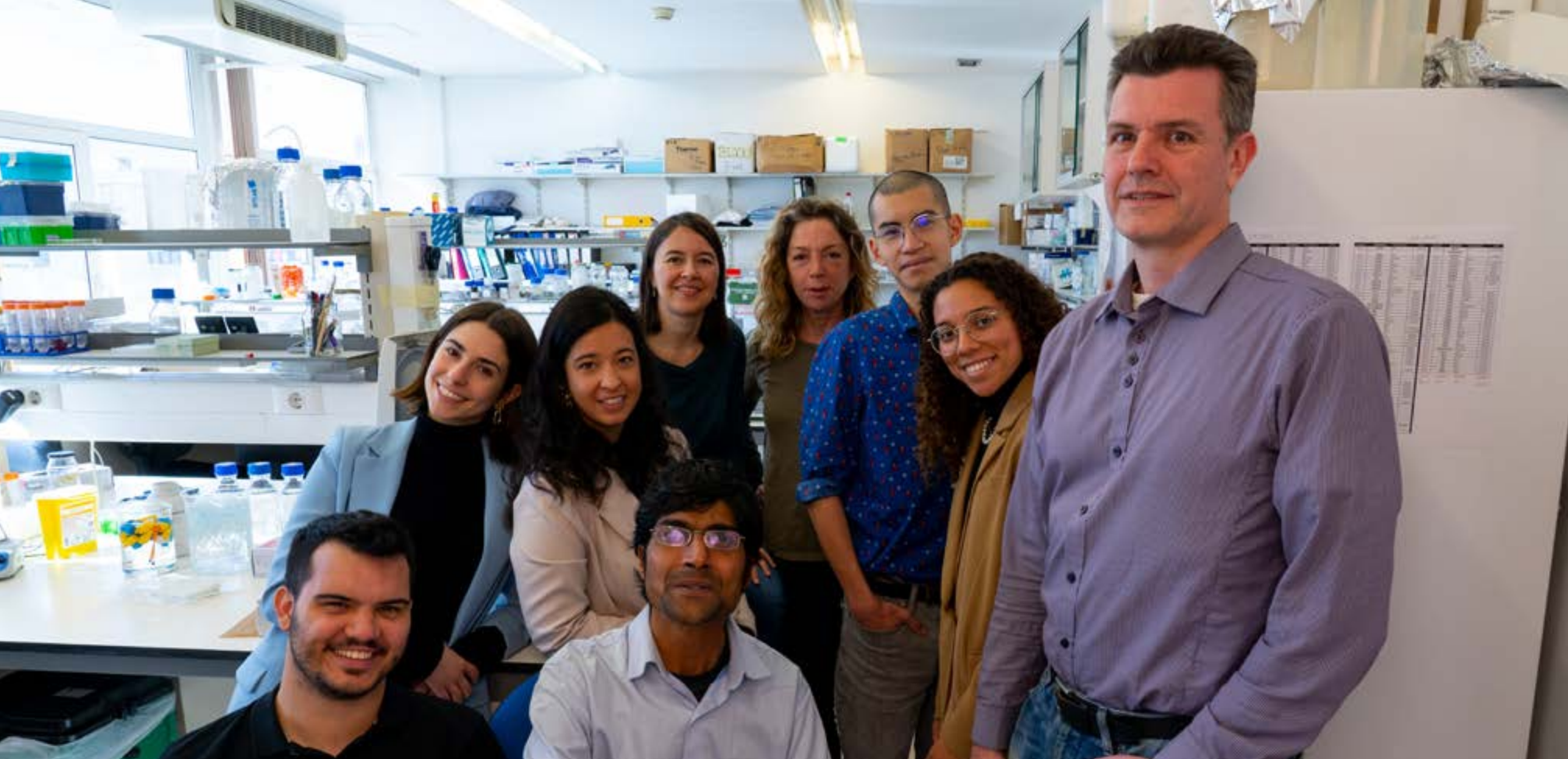
Canto E Castro L, Gomes A, Serrano M, Pereira AHG, Ribeiro R, Napoleão P, Domingues I, Silva C, Fanczal J, Afonso , Lopes A, Toader I, de Sousa MJR, de Sousa JGR, de Sousa G, Mota MM, Silva-Santos B, Veldhoen M, Ribeiro RM (2022) [Longitudinal SARS-CoV-2 seroprevalence in Portugal and antibody maintenance 12 months after infection](#). **Eur J Immunol.** 52:149-160. DOI: 10.1002/eji.202149619

Gordino G, Costa-Pereira S, Corredeira P, Alves P, Costa L, Gomes AQ, Silva-Santos B, Ribot JC (2022) [MicroRNA-181a restricts human \$\gamma\delta\$ T cell differentiation by targeting Map3k2 and Notch2](#). **EMBO Reports.** 23(1):e52234. DOI: 10.15252/embr.202052234

Mensurado S, Silva-Santos B (2022) [Battle of the \$\gamma\delta\$ T cell subsets in the gut](#). **Trends Cancer.** (11):881-883. DOI: 10.1016/j.trecan.2022.08.006.

Sánchez Martínez D, Tirado N, Mensurado S, Martínez-Moreno A, Romecín P, Gutiérrez Agüera F, Correia DV, Silva-Santos B, Menéndez P (2022) [Generation and proof-of-concept for allogeneic CD123 CAR-Delta One T \(DOT\) cells in acute myeloid leukemia](#). **J Immunother Cancer.** 10(9):e005400. DOI: 10.1136/jitc-2022-005400

Tan L, Inácio D, Prinz I, Silva-Santos B (2022) [New insights on murine \$\gamma\delta\$ T cells from single-cell multi-omics](#). **Sci Bull.** 67(11):1102-1104. DOI: 10.1016/j.scib.2022.03.008



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Marc Veldhoen Lab

Immune regulation

We are interested in T cell biology, from their development to their activation, differentiation in specialized subsets and the generation and maintenance of memory cells that offer long-term immunity. In 2022, we completed two projects: one on the metabolism of intraepithelial T cells, and the second on how tissue resident memory T cells are generated in the context of an infection. 2022 also saw the completion and publication of our COVID-19 efforts with 4 manuscripts published.

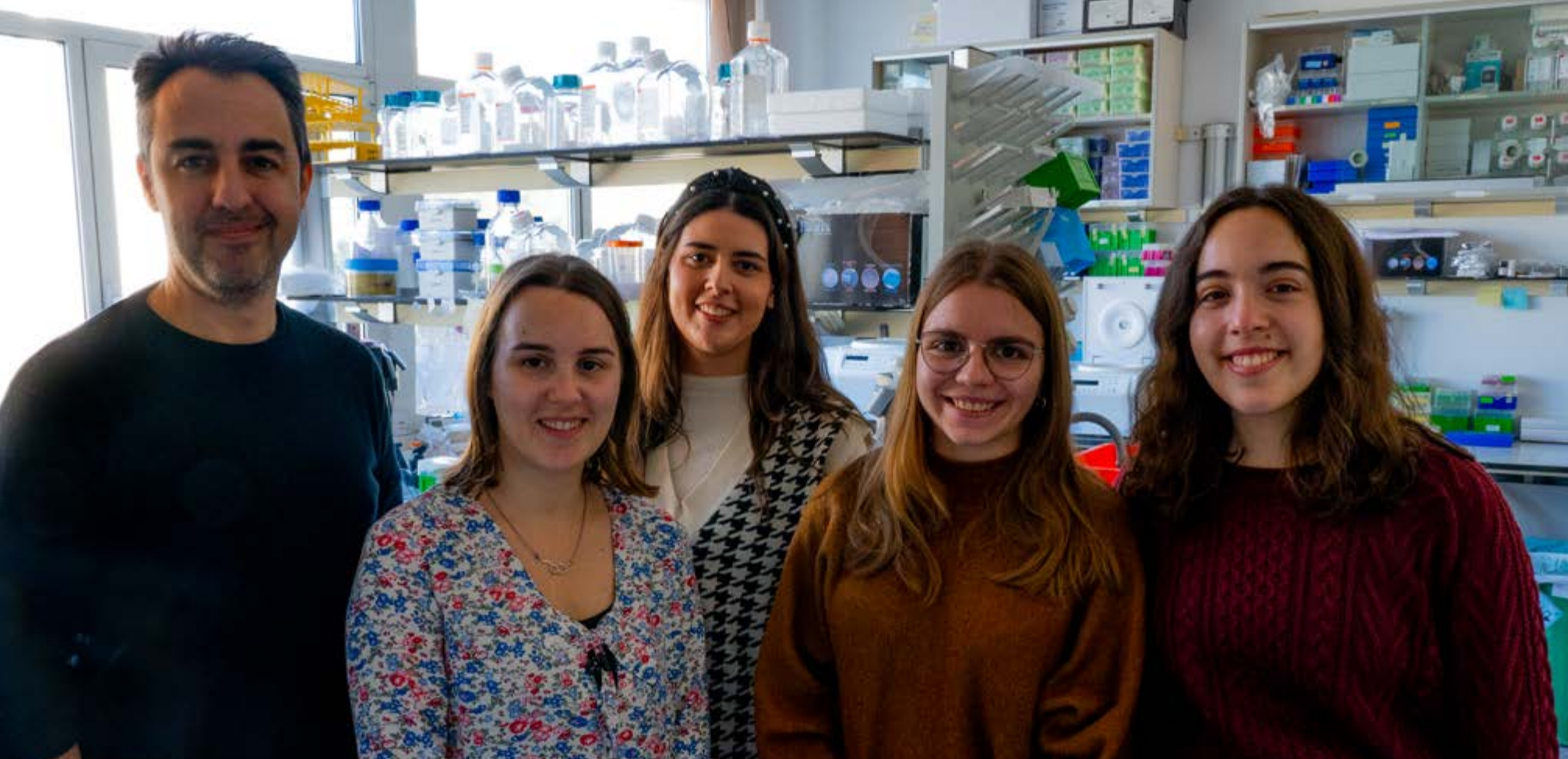
Selected Publications:

Canto E Castro L, Gomes A, Serrano M, Pereira AHG, Ribeiro R, Napoleão P, Domingues I, Silva C, Fanczal J, Afonso , Lopes A, Toader I, de Sousa MJR, de Sousa JGR, de Sousa G, Mota MM, Silva-Santos B, Veldhoen M, Ribeiro RM (2022) [Longitudinal SARS-CoV-2 seroprevalence in Portugal and antibody maintenance 12 months after infection](#). **Eur J Immunol.** 52:149-160. DOI: 10.1002/eji.202149619

Cruz-Machado AR, Barreira SC, Bandeira M, Veldhoen M, Gomes A, Serrano M, Duarte C, Rato M, Miguel Fernandes B, Garcia S, Pinheiro F, Bernardes M, Madeira N, Miguel C, Torres R, Bento Silva A, Pestana J, Almeida D, Mazedo C, Cunha Santos F, Pinto P, Sousa M, Parente H, Sequeira G, Santos MJ, Fonseca JE, Romão VC (2022) [Risk factors for infection, predictors of severe disease, and antibody response to COVID-19 in patients with inflammatory rheumatic diseases in Portugal - A multicenter, nationwide study](#). **Front Med.** 9:901817. DOI: 10.3389/fmed.2022.901817

Konjar Š, Ferreira C, Carvalho FS, Figueiredo-Campos P, Fanczal J, Ribeiro S, Morais VA, Veldhoen M (2022) [Intestinal tissue-resident T cell activation depends on metabolite availability](#). **Proc Natl Acad Sci USA.** 119(34):e2202144119. DOI: 10.1073/pnas.2202144119

Mukherjee D, Chora F, Lone JC, Ramiro RS, Blankenhaus B, Serre K, Ramirez M, Gordo I, Veldhoen M, Varga-Weisz P, Mota MM (2022) [Host lung microbiota promotes malaria-associated acute respiratory distress syndrome](#). **Nat Commun.** 13(1):3747. DOI: 10.1038/s41467-022-31301-8



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Pedro Sousa-Víctor Lab

Selected Publications:

Sousa NS, Brás MF, Antunes IB, Lindholm P, Neves J, Sousa-Victor P (2022) [Ageing disrupts MANF-mediated immune modulation during skeletal muscle regeneration](#). **bioRxiv**. DOI: 10.1101/2022.07.20.500588

Aging & tissue repair – stem cell aging

We are interested in regenerative medicine as a solution to the general decline in physiological integrity and vulnerability to disease that accompanies the aging process. Our goal is to understand the mechanisms of stem cell aging and develop stem cell-based interventions to rejuvenate aged organs. Currently, we are using muscle aging as a model system to explore and modulate the repair response of old organisms. In 2022, we advanced two projects aiming to define how immune modulatory strategies can be applied to improved regenerative capacity in old age. We also found an unexpected role for immune signaling in the regulation of muscle stem cell plasticity.

Finance & Operations Office:

Fausto Lopo de Carvalho
Finance and Operations Director

fausto.carvalho@medicina.ulisboa.pt



The Finance and Operations Office operates under an agile organizational model with six departments - **Project Management, Purchasing and Procurement, Accounting, Legal and Human Resources, Safety and Compliance** and **Molecular Diagnostic Unit** each with a dedicated Area Manager empowered to design and implement the strategy for each department, aligned with IMM overall priorities.

The Finance and Operations Office main purpose is to maintain an extremely agile structure to give the best support to the scientific community. The six areas working in collaboration allow for a unified 360° view of the full science management loop, starting with pre-award counseling and applications revision to post-award financial and operational follow-up. This is coordinated by the project management team in proximity with the purchases team, responsible for maintaining full compliance in procurement alongside with internal legal counseling. The process ends with the accounting booking processes and reporting executed by the accounting team.

Finally, all safety procedures regarding lab management are fully integrated in this process as a vital part of IMM's operations infrastructure. The Finance and Operations Office is also responsible for audit processes coordination and to assure the liaison with all financing bodies. Upon request, it develops specific studies on relevant matters with nationwide impact for the Portuguese scientific landscape.



2022 marked the finalization of a large-scale COVID-19 operation, which involved nursing homes in 5 districts and 81 counties throughout the national territory. The operation ended successfully and served as a national benchmark on how scientific institutions can step in to address major emergency health related topics, inspiring the future progression path of IMM. As a result, IMM applied to a Teaming proposal – IMM-Care – to create a center of excellence in human centered clinical and translational research in Portugal. The preparation of this successful proposal engaged several departments at IMM, from the Tech Transfer Office, which gave a decisive contribution, to the Finance and Operations Office, which contributed with a robust business case that supported the claim for long-term sustainability of the center. The close collaboration and positive contribution from every team is evermore one of the major achievements of the Finance and Operations Office, and one of the major success factors.

What we expected to be a year with less disruption to the supply-chain due to the COVID-19 pandemic and a year of stabilization was, instead, a year with multiple changes. The disruption caused by the Ukraine-Russia war and the soaring energy crisis that followed, impacted prices along the whole supply-chain and caused an inflation that created new challenges that the Purchasing and Procurement team has to surpass. As for Safety and Compliance, the team completed the Occupational Safety and Health and the Environment Management System documentation, improving IMM culture and development in these two important areas. Besides, the Safety and Compliance dealt with important transformations regarding fit-out works and infrastructural adaptations, and the end of 2022 came with new plans for new labs to be set-up in the first quarter of 2023.

Accounting

Sandra Duarte

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IMM statutory accounts and tax returns;
Cost accounting;
Reporting and compliance with funding bodies accounting practices;
Dedicated report building on cash flow and human resources costs.

Purchasing & Procurement

Alexandre Jesus

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Tendering according to Portuguese and European legislation;
Verification of the validity of expenses associated with a research project;
Placing the order to the supplier;
Tracking delivery times and updating the researcher on lead times.

Safety & Compliance

Sara Santos

imm-safety@medicina.ulisboa.pt

Ensure all infrastructure, equipment and material requirements for high-quality research;
Ensure a safe and healthy working environment, with minimum environmental impact and complying with all legal requirements.

Project Management

Madalena Reis

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From contractual start to final report submission;
Related-support to researchers;
Execution control through project life cycle;
Coordination of internal and external audits to projects;
Risk monitoring to foresee future tendencies in cost evolution.

Legal & Human Resources

Inês Bilé

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Institutional and Researcher's legal support;
Human resources management.

Molecular Diagnostic Unit

Patricia Napoleão

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Fast-track translational research to deliver health care solutions;
Design new preventive, diagnostic and/or personalized solutions, followed by scalable systems solutions;
Certified COVID-19 testing site.

Facilities:

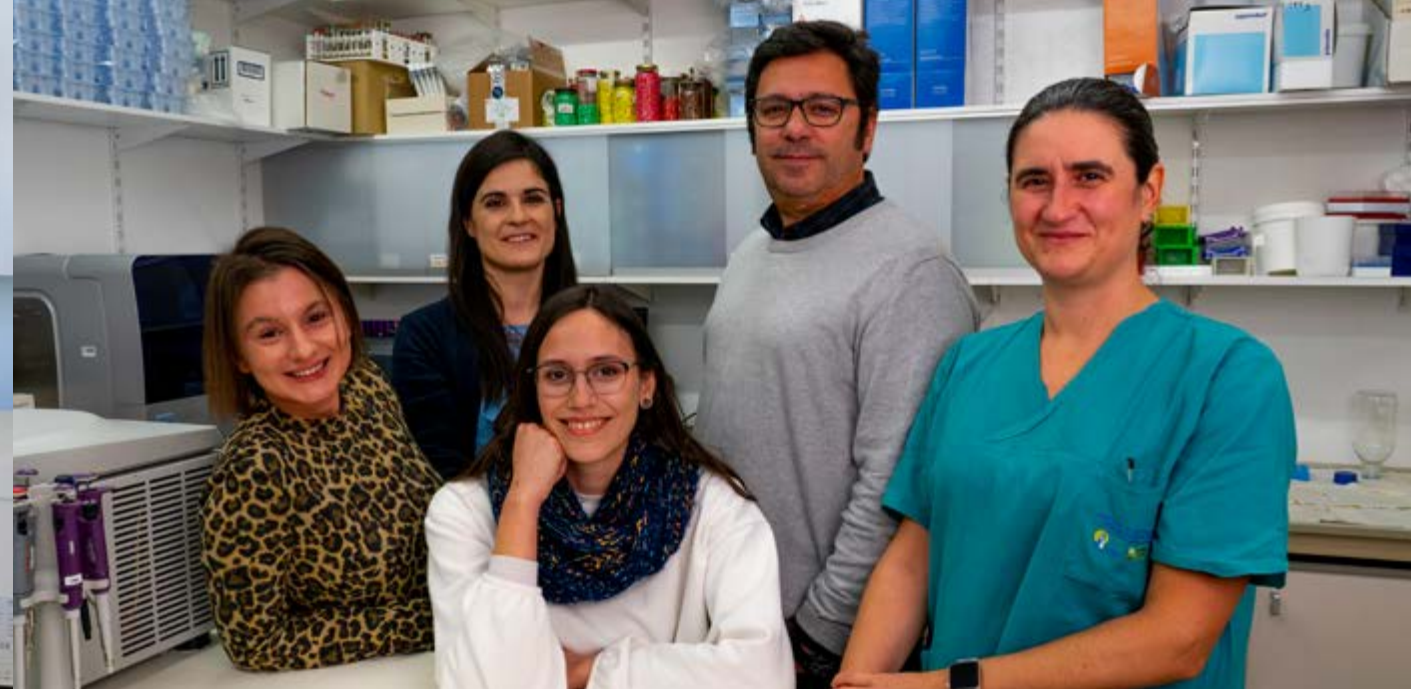
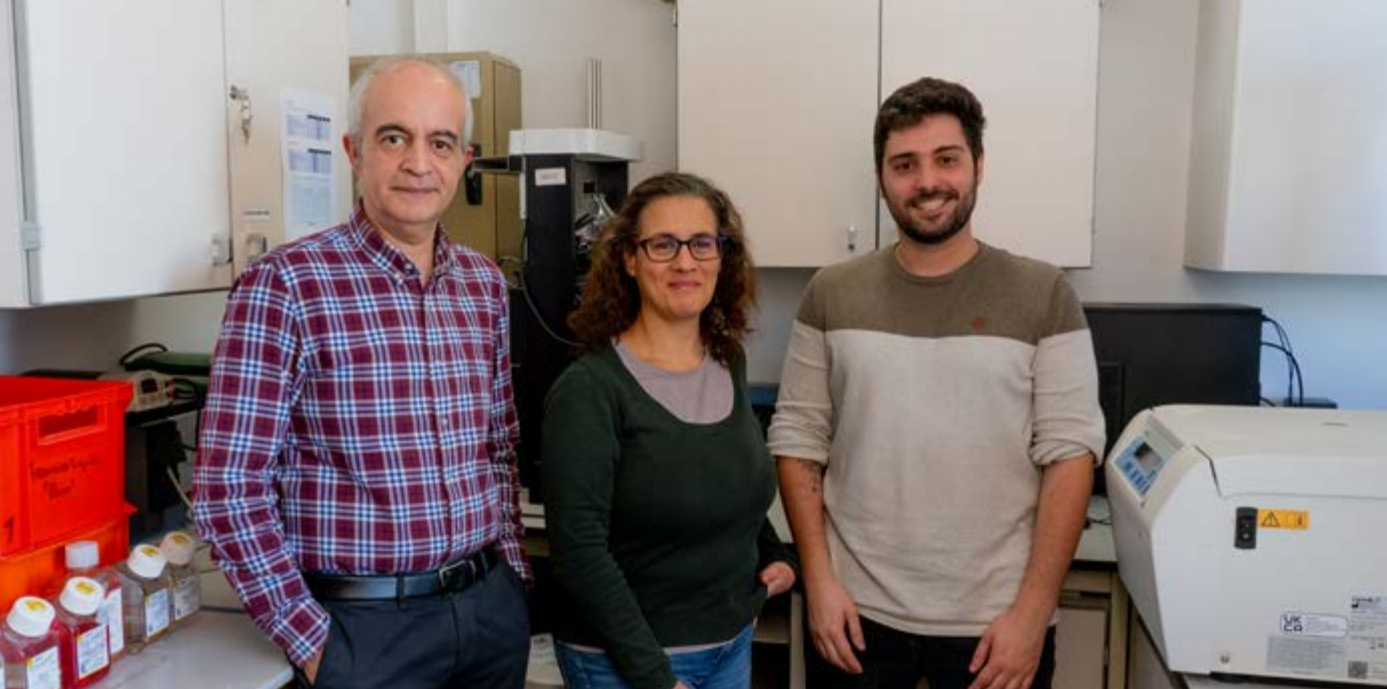
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IMM Highlights 2022



Analytical and Structural Biochemistry Unit

Francisco J. Enguita
imm-asb@medicina.ulisboa.pt

The Analytical and Structural Biochemistry (ASB) unit is devoted to the production, analysis and functional characterization of biological macromolecules including recombinant proteins, antibodies and nucleic acids. We also offer our expertise in bioinformatics and structural biology to the IMM community for the study of structure-function relationships in biological macromolecules and *in-silico* drug design by computer-aided methods.

In 2022, the Analytical and Structural Biochemistry unit continued its implementation in the scientific community of the IMM and Lisbon Medical School, expanding its portfolio of chromatographic techniques and the network of internal collaborations.

Selected Publications

Enguita FJ, et al., (2022) *The interplay between lncRNAs, RNA-binding proteins and viral genome during SARS-CoV-2 infection reveals strong connections with regulatory events involved in RNA metabolism and immune response*. **Theranostics**. 12(8):3946-3962. DOI: 10.7150/thno.73268

Leitão AL, Enguita FJ (2022) *A structural view of miRNA biogenesis and function*. **Noncoding RNA**. 8(1):10. DOI: 10.3390/ncrna8010010

Martins-Marques T, et al., (2022) *Cx43-mediated sorting of miRNAs into extracellular vesicles*. **EMBO Rep**. 23(7):e54312. DOI: 10.15252/embr.202154312

Pinzon Cortes JA, et al., (2022) *The non-coding RNA journal club: Highlights on recent papers-10*. **Noncoding RNA**. 8(1):3. DOI: 10.3390/ncrna8010003



Biobank Unit

Cláudia Faria
Sérgio Dias
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Biobanks are strategic tools for the development of medicine and translational research. The Biobanco-iMM CAML includes biological samples (from surgery, biopsies, blood samples, ...) which are voluntarily donated with permission for preservation and future use in biomedical research by researchers around the world. The Biobanco-iMM CAML allows the study of the pathogenesis of multiple diseases with enormous impact on human health (such as neurological diseases, rheumatic disorders and cancer), improving the identification of new prognostic and diagnostic tests and new therapeutic targets.

In 2022, Biobanco-iMM CAML collected samples from 1163 new donors, aged between 1 and 91 years old, comprising 27 500 donors at the biobank. The biobank established 4 new collections (depression, Angelman syndrome, multiple sclerosis and monkeypox).

Selected Publications

Canto E Castro L, et al., (2022) *Longitudinal SARS-CoV-2 seroprevalence in Portugal and antibody maintenance 12 months after infection*. **Eur J Immunol**. 52:149-160. DOI: 10.1002/eji.202149619

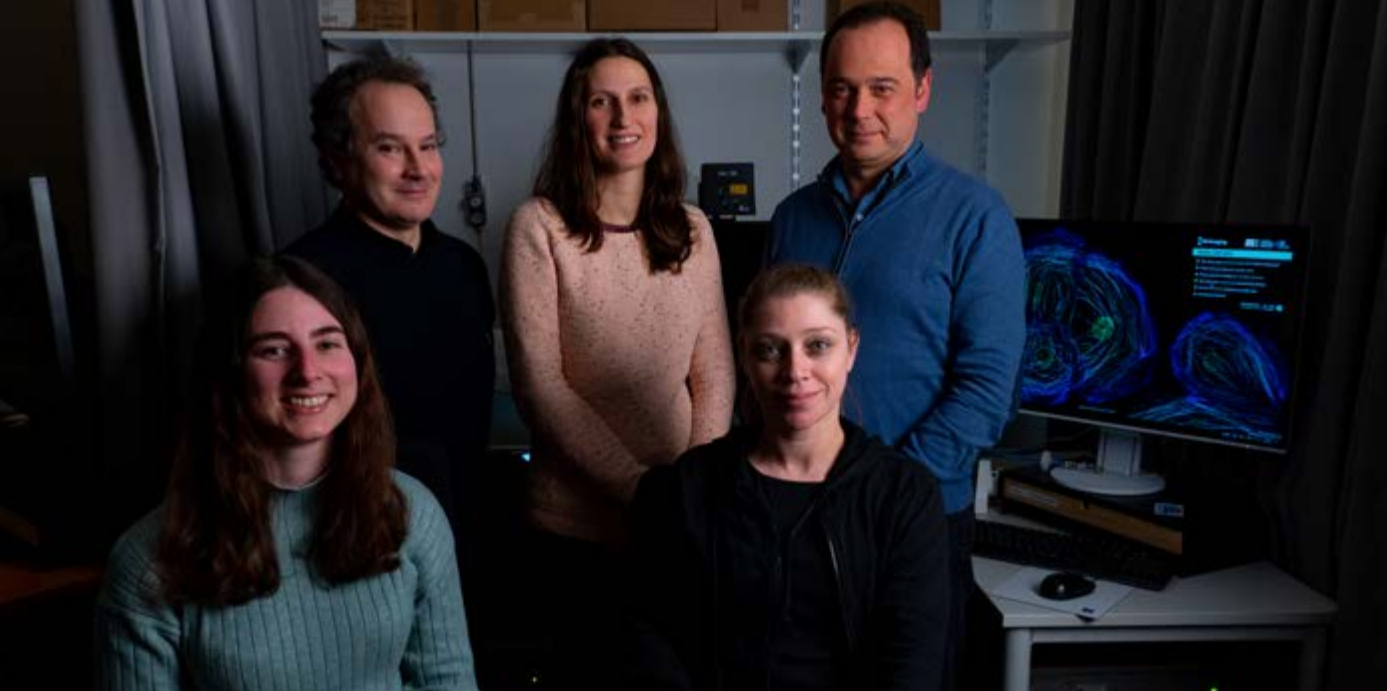
Cruz-Machado AR, et al., (2022) *Risk factors for infection, predictors of severe disease, and antibody response to COVID-19 in patients with inflammatory rheumatic diseases in Portugal - A multicenter, nationwide study*. **Front Med**. 9:901817. DOI: 10.3389/fmed.2022.901817

Faria CC, et al., (2022) *Patient-derived models of brain metastases recapitulate human disseminated disease*. **Cell Rep Medicine**. 3(5):100623. DOI: 10.1016/j.xcrm.2022.100623

Martins EP, et al., (2022) *Cadherin-3 is a novel oncogenic biomarker with prognostic value in glioblastoma*. **Mol Oncol**. 16(14):2611-2631. DOI: 10.1002/1878-0261.13162

Qin N, et al., (2022) *Intratumoral heterogeneity of MYC drives medulloblastoma metastasis and angiogenesis*. **Neuro-oncol**. 24(9):1509-1523. DOI: 10.1093/neuonc/noac068





Bioimaging Unit

José Rino

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The Bioimaging Unit acts as a support structure to help and nurture research done with Light Microscopy inside the institute. Besides managing high-end resources that include multi-photon, point-scanning confocal, spinning disk confocal, light-sheet and widefield systems, we sit with researchers to teach, train, and create software tools focusing on people and their questions.

In 2022, the Bioimaging Unit services were used by 184 users from 33 research labs, 5 of which from outside the IMM. During the year, we trained 44 users in at least one microscopy system, with a total of 133 training sessions and 1146 assists. We also assisted or developed tools (ImageJ macros) for image analysis and processing for 15 researchers. In 2022, two new microscopy systems were installed at the facility: Zeiss LSM 980 and Zeiss Celldiscoverer 7. Two new systems were also installed in already existing microscopes: Akoya PhenoCycler for spatial phenotyping and Ionoptix calcium and contractility measurement system.

Selected Publications

Janota CS, et al., (2022) [Shielding of actin by the endoplasmic reticulum impacts nuclear positioning.](#) **Nat Commun.** 13(1):2763. DOI: 10.1038/s41467-022-30388-3

M'Bana V, et al., (2022) [Plasmodium parasitophorous vacuole membrane-resident protein UIS4 manipulates host cell actin to avoid parasite elimination.](#) **iScience.** 25(5):104281. DOI: 10.1016/j.isci.2022.104281

Nunes-Cabaço H, et al., (2022) [Human CD4 T cells from thymus and cord blood are convertible into CD8 T cells by IL-4.](#) **Front Immunol.** 13:834033. DOI: 10.3389/fimmu.2022.834033

Silva Pereira S, et al., (2022) [Immunopathology and Trypanosoma congolense parasite sequestration cause acute cerebral trypanosomiasis.](#) **eLife.** 11:e77440. DOI: 10.7554/eLife.77440

Viegas IJ, et al., (2022) [N6-methyladenosine in poly\(A\) tails stabilize VSG transcripts.](#) **Nature.** 604(7905):362-370. DOI: 10.1038/s41586-022-04544-0



Comparative Pathology Unit

Luísa Figueiredo (Commissioner)

imm-histology@medicina.ulisboa.pt

The Comparative Pathology Unit transforms fresh and fixed biological samples (from human, mouse, rat, fish, mosquitoes et al.) into thin sections to be viewed under a light or electron microscope. The mission of the Unit is to achieve the highest level of quality in supporting researchers and to create meaningful data from gross pathology observations and histopathology. We focus our work on a continuous improvement policy to provide efficient, high quality flexible services with responsive turn-around time to researchers.

In 2022, the quality and performance of the Unit improved, and all main goals were completed successfully, including relaunching the Electron Microscopy Service in order to keep pace with the increasing EM projects. Outreach has been constant during 2022, with several invites to represent Histology/Pathology and Electron Microscopy.

Upgrading knowledge was also a major achievement as one of our team members was awarded with a CTLS grant to integrate a Shadowing and Mentoring Program.

Selected Publications

Faria CC, et al., (2022) [Patient-derived models of brain metastases recapitulate human disseminated disease.](#) **Cell Rep Medicine.** 3(5):100623. DOI: 10.1016/j.xcrm.2022.100623

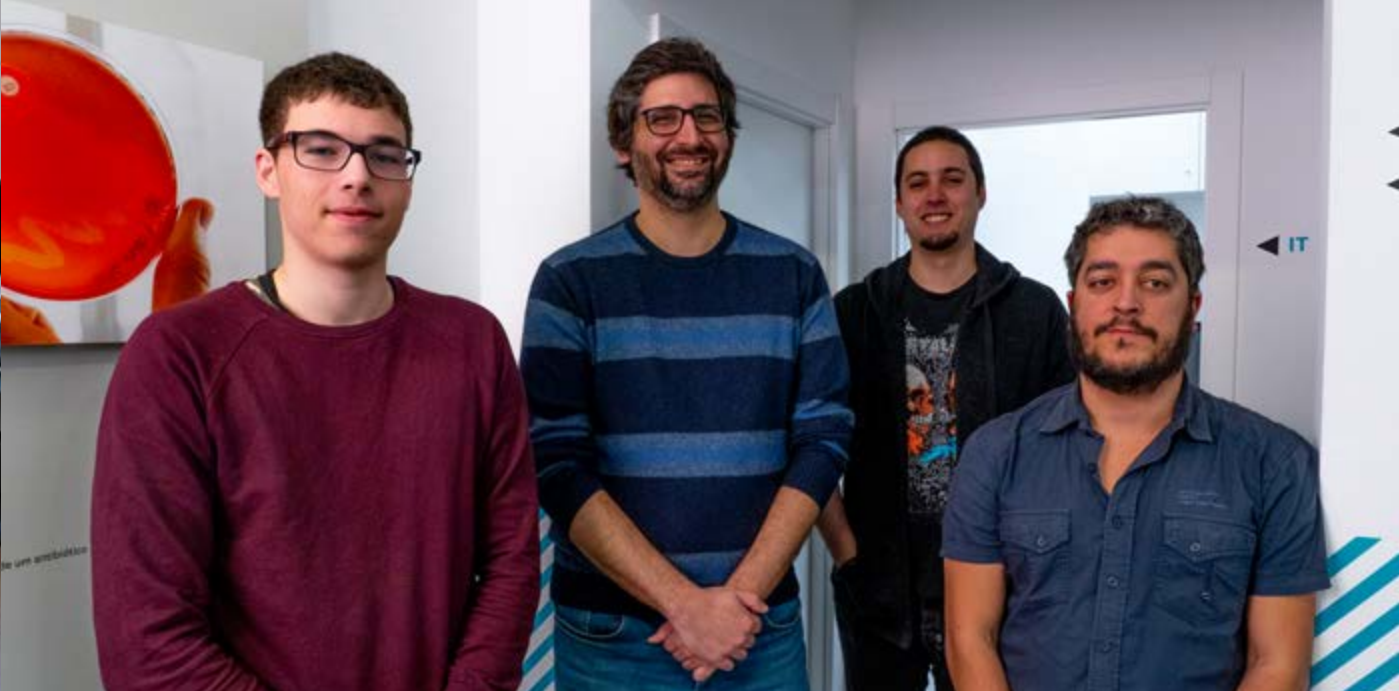
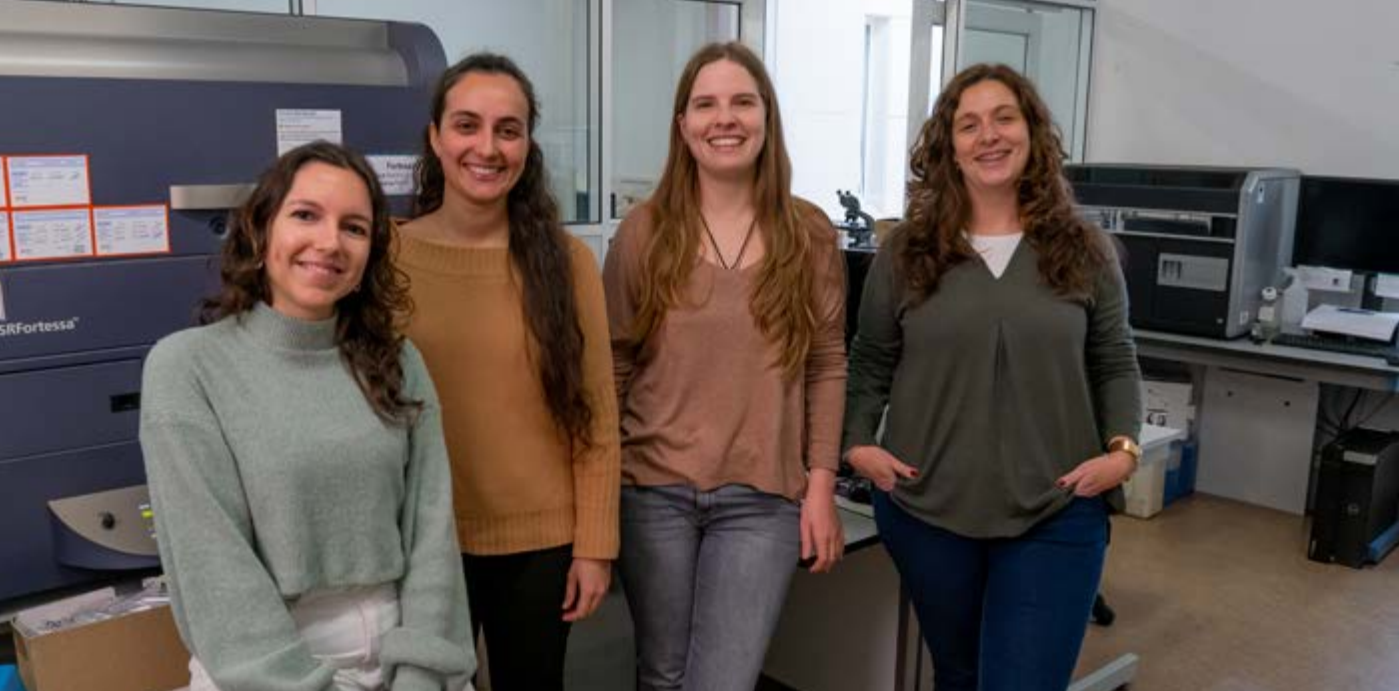
Fidalgo MF, et al., (2022) [Aerocyte specification and lung adaptation to breathing is dependent on alternative splicing changes.](#) **Life Sci Alliance.** 5(12):e202201554. DOI: 10.26508/lsa.202201554

Konjar Š, et al., (2022) [Intestinal tissue-resident T cell activation depends on metabolite availability.](#) **Proc Natl Acad Sci USA.** 119(34):e2202144119. DOI: 10.1073/pnas.2202144119

Nunes-Cabaço H, et al., (2022) [Human CD4 T Cells From Thymus and Cord Blood Are Convertible Into CD8 T Cells by IL-4.](#) **Front Immunol.** 13:834033. DOI: 10.3389/fimmu.2022.834033

Silva Pereira S, et al., (2022) [Immunopathology and Trypanosoma congolense parasite sequestration cause acute cerebral trypanosomiasis.](#) **eLife.** 11:e77440. DOI: 10.7554/eLife.77440





Flow Cytometry Unit

Mariana Fernandes

imm-flowcytometry@medicina.ulisboa.pt

The Flow Cytometry Unit provides a state-of-the-art flow cytometry service to IMM researchers as well as external groups from other research institutes. We aim at training researchers in the adequate use of the instruments and also on flow cytometry principles, experiment planning, as well as data analysis and interpretation. The facility is equipped with four cell analyzers and one imaging flow cytometer. We provide a cell sorting service, and ensure quality control and maintenance procedures on all instruments.

In 2022, we had a total of 170 users from 36 research labs, 8 of which from external groups. We trained 54 new users in at least one flow cytometry analyzer. In addition, we officially started the data analysis service, and we improved our training system.

Selected Publications

Gomes AMC, et al., (2022) [Phenotype of BTK-lacking myeloid cells during prolonged COVID-19 and upon convalescent plasma](#). *Eur J Haematol*. 1-4. DOI: 10.1111/ejh.13881

Gordino G, et al., (2022) [MicroRNA-181a restricts human \$\gamma\delta\$ T cell differentiation by targeting Map3k2 and Notch2](#). *EMBO Rep*. 23:e52234. DOI: 10.15252/embr.202052234

Konjar Š, et al., (2022) [Intestinal tissue-resident T cell activation depends on metabolite availability](#). *Proc Natl Acad Sci USA*. 119(34):e2202144119. DOI: 10.1073/pnas.2202144119

Oliveira ML, et al., (2022) [Mutant IL7R collaborates with MYC to induce T-cell acute lymphoblastic leukemia](#). *Leukemia*. 36(6):1533-1540. DOI: 10.1038/s41375-022-01590-5

Ribeiro F, et al., (2022) [Different antibody-associated autoimmune diseases have distinct patterns of T follicular cell dysregulation](#). *Sci Rep*. 12(1):17638. DOI: 10.1038/s41598-022-21576-8



Information Systems Unit

Daniel Silva

imm-itsupport@medicina.ulisboa.pt

The Information Systems Unit helps researchers reach their maximum productivity by using adequate Information Technology resources and following best practices. By accompanying the latest technological trends we also aim at providing researchers and managers at IMM with tools for enhancing data analysis and processing, communication and decision taking.

In 2022, we upgraded core facilities software (i.e. ERP, and Rodents Facility), we took the initial steps in the transition towards a Hybrid Data center with the implementation of a dedicated network for backups, and improved the team's response times and automated processes.





Rodents Unit

Iolanda Moreira

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The Rodent Facility supports scientific projects associated with animal experimentation, working towards state-of-the-art animal-based research while maintaining the highest standards of animal welfare. The Rodent Facility strictly follows Portuguese and international laws and recommendations governing good practices and animal welfare. The facility is highly committed to provide training and education to achieve the best practices in Laboratory Animal Science.

In 2022, we created a continuous training and education plan for caretakers and technicians that will allow for the continuous evolution of the care provided to animals with a focus on ensuring the best performance of the service. We implemented a new set of colony management rules, with the aim of reducing the number of animals produced at iMM, in line with legal requirements and best practices, as well as in compliance with the 3R's policy.

Selected Publications

Chegão A, et al., (2022) [Glycation modulates glutamatergic signaling and exacerbates Parkinson's disease-like phenotypes](#). **NPJ Parkinsons Dis.** 8(1):51. DOI: 10.1038/s41531-022-00314-X

De Niz M, et al., (2022) [Surgical and intravital microscopy protocol to image Trypanosoma brucei-host interactions in live rodent models](#). **STAR Protoc.** 3(2):101450. DOI: 10.1016/j.xpro.2022.101450

Konjar Š, et al., (2022) [Intestinal tissue-resident T cell activation depends on metabolite availability](#). **Proc Natl Acad Sci USA.** 119(34):e2202141119. DOI: 10.1073/pnas.2202141119

Silva Pereira S, et al., (2022) [Immunopathology and Trypanosoma congolense parasite sequestration cause acute cerebral trypanosomiasis](#). **eLife.** 11:e77440. DOI: 10.7554/eLife.77440

Trindade S, et al., (2022) [Slow growing behavior in African trypanosomes during adipose tissue colonization](#). **Nat Commun.** 13(1):7548. DOI: 10.1038/s41467-022-34622-W



Zebrafish Unit

Leonor Saúde

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The Zebrafish Unit provides a fully functional facility to be used by the iMM research units with technical assistance to facilitate the use of zebrafish in a wide range of experimentation sets.

In 2022, the Fish Facility reduced its environmental impact by recycling most commonly used plastic materials, established and improved communication channels with users, and improved the zebrafish health plan in collaboration with a veterinary.

Selected Publications

de Sena-Tomás C, et al., (2022) [Activation of Nkx2.5 transcriptional program is required for adult myocardial repair](#). **Nat Commun.** 13(1):2970. DOI: 10.1038/s41467-022-30468-4

Oliveira ML, et al., (2022) [Mutant IL7R collaborates with MYC to induce T-cell acute lymphoblastic leukemia](#). **Leukemia.** 36(6):1533-1540. DOI: 10.1038/s41375-022-01590-5

Ribeiro A, et al., (2022) [New functional vessels form after spinal cord injury in zebrafish](#). **BioRxiv.** DOI: 10.1101/2022.06.09.495446

Silva S, et al., (2022) [Therapeutic potential of deflamin against colorectal cancer development and progression](#). **Cancers.** 14(24):6182. DOI: 10.3390/cancers14246182





Communication Office

Inês Domingues

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The Communication is IMM's first line of interaction with society providing updated, reliable and relevant information on all of IMM's thematic areas, as well as promoting the very best scientific successes made by its research teams. Its mission is to support the internal and external communication of IMM's activities, as well as to advise IMM Direction on Public Affairs issues. With the firm belief that science should inform decisions because it impacts everyone's lives, the Communication targets a wide range of audiences.

In 2022, our communication strategies resulted in an extensive media presence, and a pronounced increase in non-COVID-19 related news compared with the previous year.

We were awarded an MSCA and Citizens Grant within a consortium that allowed the start of the Researchers in Action for Inclusion in Science and Education

(RAISE). Within the scope of this project we expanded our outreach activities, and co-organized the European Researchers' Night at Champalimaud Foundation. We expanded the services provided for the IMM community, by including science graphical design and illustration, as well as multimedia support.

Selected Publications

Canto E Castro L, et al., (2022) [Longitudinal SARS-CoV-2 seroprevalence in Portugal and antibody maintenance 12 months after infection](#). *Eur J Immunol*. 52:149-160. DOI: 10.1002/eji.202149619



Pre-Award Office

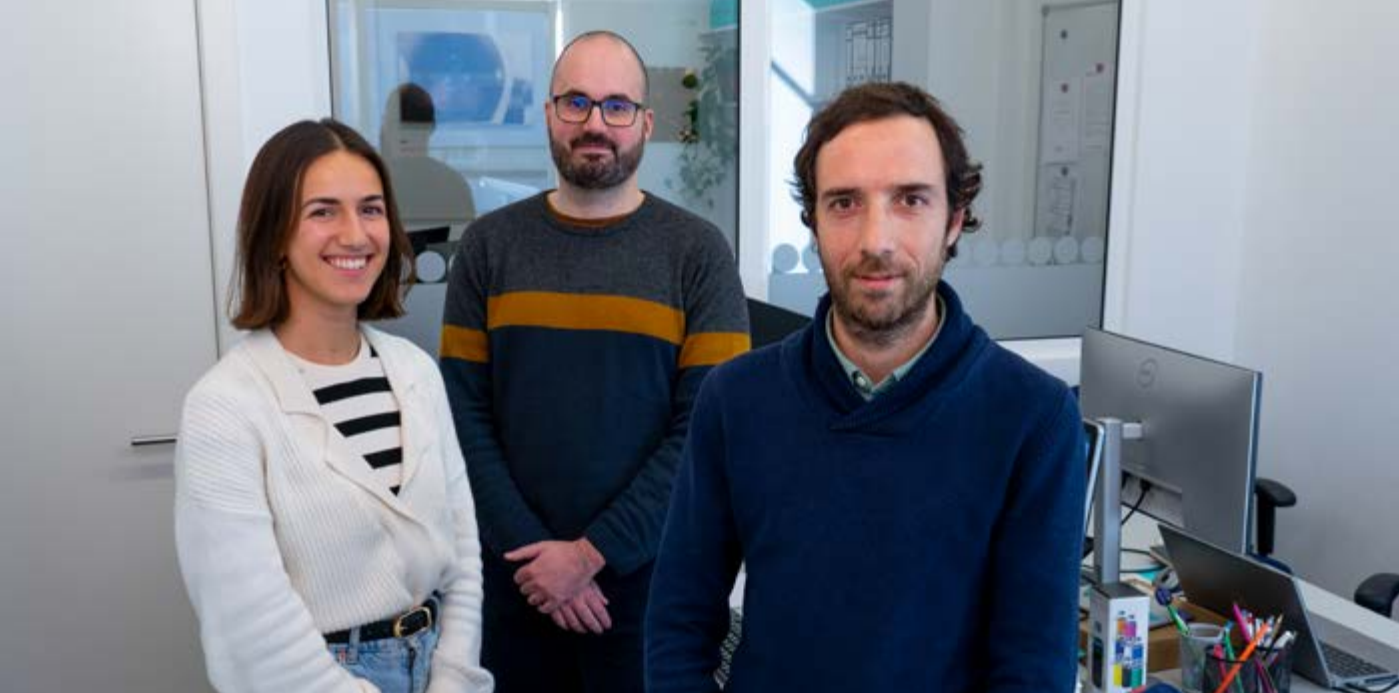
Joana Costa

imm-funding@medicina.ulisboa.pt

The Pre-Award Office proactively supports the IMM community in securing competitive funds for research and institutional activities, in compliance with the terms and conditions of the funding agencies, by offering individualized professional support on the preparation and submission of proposals and on the negotiation of successfully funded applications.

In 2022, the Pre-Award Office supported 223 applications to 40 different international and 17 different national funding programmes.





Technology Transfer Office

Pedro Silva

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The Technology Transfer Office stimulates the valorization of knowledge produced at IMM through the creation of a favorable internal environment to foster innovation and speed up the translation of promising ideas and results into new medical solutions; the protection and licensing of intellectual property; the promotion of entrepreneurship and the creation of start-ups; a closer interaction with industry (at national and international level) leading to new collaborations; and the participation in relevant National and European networks and initiatives related with translational research.

In 2022, in addition to other projects, we coordinated a Teaming proposal - IMM-CARE - that was approved for funding, we achieved IMM's Recognition as a Technology and Innovation Centre by the National Innovation Agency, and we obtained approval of the base funding for the CoLAB AccelBio to strengthen the drug discovery capacity in Portugal.



Training Hub

Claus M. Azzalin

imm-traininghub@medicina.ulisboa.pt

The Training Hub ensures the proper integration of overall training activities at IMM that are tailored for researchers at different stages of their careers, aiming for an internationally competitive career in academia, industry or clinical medicine environments.

We work closely with MSc students, PhD students, and Postdoctoral researchers to maximize their career prospects through specific programs and activities.

In 2022, we operationalized the Master Course in Biomedical Research, in collaboration with FMUL, and implemented the Master program @iMM that comprehends the assembly and dissemination of IMM's Master project proposals/vacancies, the Best Master Thesis Awards, the Master Day and the Welcome Session; we coordinated the LisbonBioMed PhD program, increasing in 10% the number of applications by foreigners and expanded

the monitoring of the PhD experience at IMM by meeting with all 4th-year PhD students in the context of the PhD Tracker program; we launched the Lídia Silva Santos Postdoctoral Achievement Award, the first award at IMM directed at the postdoctoral community; and expanded the IMM Alumni network to more than 400 members.



iMM: our home for chasing questions:



Bernardo Antunes
PhD Student, Vanessa Morais Lab

“The iMM rooftop on the 3rd floor is the space I am most fond of, as it is the place for the many social gatherings.”

What would you like to see most in iMM for the next few years? How do you think that would contribute to iMM?

Although I consider iMM to be a place where gatherings and the exchanges of social experiences and ideas are encouraged, I think it would gain even more by encouraging the holding of events with other institutes with a higher frequency. In hindsight, attending the COLife PhD day this year was an experience from which I gained a lot, speaking from the perspective of a PhD student, and even though iMM already hosts a panoply of people from the most diverse backgrounds, there is still so much more we can learn, and share! I think this would help building even more bridges between people and labs, strengthening the possibility for networking, that we can all agree is one of the major career backbones that, when doing good science, we all must strive to achieve.

How do you expect iMM will shape your professional path?

To be honest I do not know yet whether by the end of my PhD I will want to remain in science or try my luck elsewhere. Nevertheless, doing my PhD at iMM is providing me with the tools to, if choosing the former, build a strong foundation in terms of looking at science with a critical but enthusiastic view. Moreover, the close relationship between PIs and students that iMM fosters is doubtlessly another feature that helps one who wants to pursue a career in science to know which are the best paths to follow if to succeed as a postdoc and later

a group leader. In my case, iMM has shaped already my professional path, in the sense that it enabled me to work in close proximity and come acquainted with some of the best in my field, which will boost my chances of ever becoming one.

Is iMM and the iMM community shaping your views on science? If so, in which ways?

One of iMM's greatest advantages is that it houses a significant number of groups that conduct excellent research in diverse fields. I feel that, since the beginning of my PhD, being able to attend so many, and such different presentations of either students or group leaders, and listening and participating in the discussions has been re-shaping my way of doing science. It showed me how to develop a critical mind that I daresay is now sharper compared with times I was starting to work here. Before iMM, my mindset was already that science exists to improve the quality of people's lives in any way possible. After COVID, how science in general, and iMM in particular, came forth to make that happen only reinforced my opinion.

What do you believe could be the main contributions of iMM to science & society in the future?

I think the best contribution for science and society is to bring science and society together. iMM did that in the recent past, with COVID, creating a task force that enabled testing at a very fast pace to try and meet the necessities of society, and promoting the dissemination of science based information to help people to look at the pandemic through facts, not fear and misinformation. It was a time where our heroes wore not capes but lab coats. Nowadays however, it seems that with the normalization of the pandemic and things going back to the previous normal, the gap between science and society may be widening again. In my opinion the holding of events that promote the reconnection of the two realities, such as the European Researchers' Night that iMM already promotes, is the key for this. In our Town Halls we have a clear example of how bringing people from several stages of their lives and careers together can improve us as an Institute. Maybe, in a broader perspective, Town Halls between science and society are a key for the future as well...

What is the physical space at iMM that means more to you, and why?

Besides my lab, where I spend most of my time, I would say the iMM rooftop on the 3rd floor is the space I am most fond of, as it is the place for the many social gatherings that for me make iMM such a special place, where people can meet to talk about their work and so much more, in an informal and friendly environment. In my case, no small part of the friendships made since I began to work here started in that very spot.



Valentina Riva

Postdoc, Claus M. Azzalin Lab

“The 3rd floor gathering space (and IMM snack corner!) and “The Azzalins” office: here I always found the support I needed...”

What would you like to see most in IMM for the next few years? How do you think that would contribute to IMM?

What I wish the most for IMM is to grow inexorably not only as a physical institute, but also being able to attract even more international scientists and young students at the beginnings of their scientific career. This must happen independently of their race, nationality and economic background. Sometimes you can be an incredible scientist, but you don't have the opportunity to have a family that is supporting you. And, if this happens, it is a loss for the entire scientific community. If IMM will be able to attract scientists from all over the world and support their relocations, it will promote diversity, becoming an even more vibrant environment and prove to be an example for all the other big institutes around the world.

How do you expect IMM will shape your professional path?

For me IMM represents my first real experience abroad. Coming here allowed me to be inserted within a renewed and dynamic young institute with state-of-the-art technical facilities and high-profile administrative services. The lectures and workshops that IMM routinely organizes allowed me to meet national and international scientists from which I tried to learn and be inspired. IMM is certainly allowing me to grow as a scientist, to become more confident about my skills, my qualities and, why not, my flaws. I expect IMM will allow me to become

a competitive researcher, ready to move forward to my next professional challenge.

Is IMM and the IMM community shaping your views on science? If so, in which ways?

I think it did: IMM taught me that there can be different ways of doing science without a right and a wrong. IMM also made me realize that there aren't positions of series A and series B: I think most of us without the support of all our facilities will be completely lost. Science means community and only all together we can chase the biggest questions!

What do you believe could be the main contributions of IMM to science & society in the future?

No doubt that IMM science will continue to be great with many new discoveries regarding human health in general and passing through cell biology, cancer biology, immunology, parasitology and neurosciences.

From a more general perspective, I think the work of the Board of Directors was spectacular: they were able, together with many scientists of the IMM community, to be more and more close to the public. Scientists cannot be anymore seen as someone distant and untouchable, but they need to be a reference point for society. Considering also all the active collaborations with the Hospital de Santa Maria, I think IMM will be able to do more translational science in the next, and not so distant, future.

What is the physical space at IMM that means more to you, and why?

I think I have two physical spaces that mean a lot to me: one is the 3rd floor gathering space (and IMM snack corner!) that allowed me to meet the vast majority of IMM community in an informal way discussing science but also having a lot of fun! The second space is more personal and is “The Azzalins” office: here I always found the support I needed... either scientifically as personally speaking. Thank you guys!



Moara Lemos

Technician, Comparative Pathology Unit

“IMM is shaping my views on science by promoting the exchange of information in the different fields of medical sciences.”

What would you like to see most in IMM for the next few years? How do you think that would contribute to IMM?

For the next few years, what I would like to see the most at IMM is more interaction between the IMM community and the civil society. We have an initiative, the Town Hall, where I saw an amazing conversation between the IMM community and the board and that was very healthy in my opinion.

A similar initiative could be done with civilians as teachers, medical doctors, and nurses, that would help to disseminate the scientific information relevant with practical impact in people's lives.

How do you expect IMM will shape your professional path?

I expect that IMM will invest in electron microscopy courses, workshops and international conferences for my personal training and for the development of the electron microscopy facility. For this, it will be important to have investment and access to more recent techniques in Electron Microscopy and tools.

Is IMM and the IMM community shaping your views on science? If so, in which ways?

Yes, IMM is shaping my views on science by promoting the exchange of information in the different fields of medical sciences, and by bringing people from different institutions to share with us their experiences and recent findings.

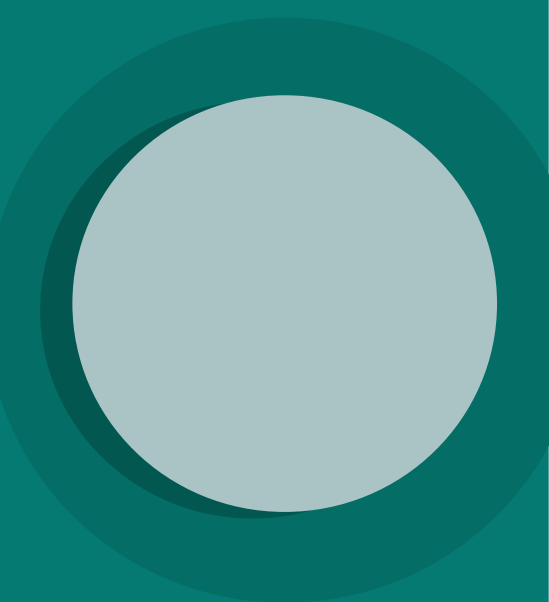
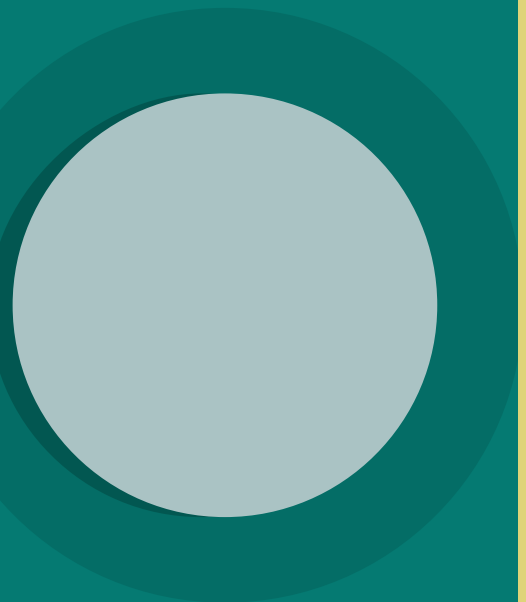
What do you believe could be the main contributions of IMM to science & society in the future?

IMM can contribute to science and society by developing and improving techniques, workflows, and experimental studies to bring new information, products or devices to be shared with the global scientific community and civil society.

What is the physical space at IMM that means more to you, and why?

The lab space. To grow, IMM needs space, which is by now a limited resource. Thinking about practical work, lab space is fundamental to accommodate more equipment and also more people. It is important to have dedicated rooms, mainly in the facilities for more sensitive equipment such as the Electron microscope and office space to accommodate people.

Training:



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Training a new generation of scientific minds



Our Programs

The training of the next generation of scientists is key for us at iMM and in recent years we have been developing and implementing programs to foster talent.

By working closely with the MSc students, PhD students, and Postdoctoral researchers, we aim to maximize their career prospects and engage in a broad range of activities.

Our Programs

FOR MASTER STUDENTS

Master in Biomedical Research

Our Master Program aims at selecting, training and awarding the best Master students at IMM. Every year IMM welcomes new Master students who develop their research projects at IMM in the scope of their thesis. Besides hosting students from different Master courses and different Faculties/Universities, IMM created its own program in collaboration with Faculdade de Medicina da Universidade de Lisboa: the Master in Biomedical Research. In 2022, on its 3rd edition, we welcomed 9 students. This multidisciplinary, transversal and integrated program provides training from bench to the bedside grounded on four major areas of biomedical research: (i) cell biology and cancer; (ii) neurosciences; (iii) cardiovascular biology; (iv) infection and immunity. The goal is to prepare independent, critical, creative, curious, and pioneer researchers with a strong training on the application of the scientific method to pursue a doctoral degree in Biomedicine. With tuition fees fully supported by IMM scholarships, the program strategy is based on tutorial and selective teaching in advanced technologies and methodologies and their relevance and application to a set of biomedical problems.

FOR PhD STUDENTS

IMM's International PhD Program – the LisbonBioMed – provides training in biomedicine, encouraging young basic and clinical researchers to work together, and to apply and produce new knowledge in the interplay between laboratory and clinical practice. The LisbonBioMed is focused on a supervised research project, complemented by a flexible and tailored curricular structure, allowing for personal selection of the set of courses matching each student's professional development, with the necessary guidance of the supervisor and thesis committee. The program includes an initial training module: “Towards a creative and critical mind”, aiming to promote student integration, fostering team bonding and interaction with the research community, introducing complementary skills training, and raising awareness to transversal competences needed for a successful research career.

Over the years, the program has hosted students from several countries, including Angola, Austria, Brazil, Cape Verde, France, Guinea, India, Italy, Poland, Portugal, Spain, Switzerland and the UK.



FOR POSTDOCS

IMM structures the Postdoctoral Training Program around specific actions that promote scientific discussions and sharing of experiences, in academia and beyond. The postdoctoral community at IMM has 106 members, as of 2022.

Winners of the IMM Best Master Thesis Awards

The winners of the IMM Best Master Thesis Award 2021/2022 were:

1st Prize:

João Fontela
João Barata Lab



2nd Prize:

Ana Fraga
Miguel Prudêncio Lab



3rd Prize:

Vicente Almeida
Supervisor: Julie Ribot
Bruno Silva-Santos Lab



Master vivas in 2022

Ana Rita Marques

“Exploring novel synthetic lethal partners for anticancer therapy”

Supervisor: Sérgio de Almeida
Co-Supervisor: Ana Rita Grosso

Maria Luísa Alvarenga

“Targeting estrogen-induced DNA damage as a new therapeutic approach in breast cancer”

Supervisor: Sérgio de Almeida
Co-Supervisor: Cristiana Morgado

Sara Barros Salgado

“Exploring the roles of PC4 in the Alternative Lengthening of Telomeres pathway”

Supervisor: Claus M. Azzalin
Co-Supervisor: Bruno Silva

Tatiana Araújo

“The role of MYH10 in IL-7R-driven B-cell Acute Lymphoblastic Leukemia”

Supervisor: João Barata

Maria Margarida Grilo

“Study the functional impact of the BRCA2 Portuguese founder mutation in mammary epithelial progenitors”

Supervisor: Noélia Custódio
Co-Supervisor: Teresa P Silva

Ana Carolina Pais

“Molecular and functional characterization of hereditary intronic variants in the BRCA1 and BRCA2 genes”

Supervisor: Célia Carvalho

Marta Sousa Santos

“Development of an APEX2-proximity labelling model to study the pathogenic effect of the BRCA2 Portuguese founder mutation”

Supervisor: Célia Carvalho

Carolina Lopes Gonçalves

“Patient-Derived Organoids as a Tool to Assess Drug Response in Pancreatic Cancer”

Supervisor: Noélia Custódio

Alexandre Montalvo

“Benign Fasciculations: a follow-up study with electrophysiological studies”

Supervisor: Mamede de Carvalho

Carolina Buga

“Spike glycoprotein: molecular characterization and inactivation of a key player in SARS-CoV-2 infection”

Supervisor: Diana Lousa
Co-Supervisor: Ana Salomé Veiga

Laura Castro

“Effect of RANK+ breast cancer cells’ secretome in monocytic differentiation”

Supervisor: Sandra Casimiro

Sara Silva

“Action mechanisms of deflamin in the treatment of colorectal cancer”

Supervisor: Marta Martins
Co-Supervisor: Álvaro Tavares

Miguel Costa

“Biological effect of type I procollagen carboxyterminal propeptide in breast cancer tumor microenvironment”

Supervisor: Ana Cavaco
Co-Supervisor: Duarte Barral

Maria Seguro

“Effect of insulin on proliferation and response to estradiol and progesterone of RANK-positive luminal breast cancers”

Supervisor: Sandra Casimiro

José Miguel Santos

“Breast of you: Inter-tumour heterogeneity of Breast Cancer and it’s follow-up through ctDNA sequencing”

Supervisor: Marta Martins

Joaquim Brito

“Comparative analysis of tumor infiltrating lymphocytes and PD-1/PD-L1 expressions between primary tumors and bone metastasis in solid cancers”

Supervisor: Luís Costa
Co-Supervisor: Sandra Casimiro

Sandra Kucharczak

“Immune profile changes in patients with renal cell carcinoma”

Supervisor: Ana Cavaco
Co-Supervisor: Marit Walbye Anthonsen

Pedro Marreiros

“Regulation of LDLR expression in breast cancer cells and its implication in tumour progression”

Supervisor: Ana Magalhães
Co-Supervisor: Carla Lopes

Ana Raquel Pereira

“Adipocyte and T. brucei adaptations in a co-culture setting”

Supervisor: Luísa Figueiredo

Beatriz Nicolau

“Lesão Renal Aguda em Crianças e Adolescentes internados numa Unidade de Cuidados Intensivos Pediátrica”

Supervisor: Patrícia Costa Reis

Catarina Silva

“Avaliação do grau de satisfação dos doentes em consulta bidisciplinar de Artrite Psoriática no Hospital de Santa Maria”

Supervisor: Elsa Sousa
Co-Supervisor: Ana Rita Machado

João Sabido

“Utilidade da ecografia com contraste no estudo da sinovite: uma revisão sistemática”

Supervisor: Joaquim Polido Pereira

Patrícia Silva

“Estudo da actividade da doença e de dano no lupus eritematoso sistémico juvenil”

Supervisor: Patrícia Costa Reis

Fábio Almeida

“Studying the expression of lncRNAs in monocytes in rheumatoid arthritis”

Supervisor: Ângelo Calado

Nadine Amaral

“Referenciação para consulta de reumatologia baseada na aplicação do questionário de rastreio da artrite psoriática precoce a doentes com psoríase”

Supervisor: Elsa Sousa

Tiago Costa

“Non-genetic models of arteriovenous malformations”

Supervisor: Cláudia Lobato
Co-Supervisor: Cláudio Franco

Tomás Ramalho

“Effects of biological therapy tapering in the radiographic progression of patients with RA, PsA and axSpA”

Supervisor: Elsa Vieira-Sousa
Co-Supervisor: Pedro Ávila-Ribeiro

Ana Sofia Fernandes

“External validation of the damage index for Antiphospholipid Syndrome in a non-american latin cohort”

Supervisor: Pedro Gaspar

Ana Filipa Bolas

“Prevalence and predictors of persisting COVID-19 symptoms, and quality of life assessment 6 months after hospital discharge”

Supervisor: Pedro Gaspar

Nuno Miguel Leal

“Nutrient Sensing in Plasmodium: The role of sirtuins”

Supervisor: Yash Pandya
Co-Supervisor: Maria Mota

Milani Sibell Rodrigues

“Epidemiologia molecular da infeção em recém-nascidos por Streptococcus agalactiae em Portugal (2016-2020)”

Supervisor: Elisabete Martins

Maria Firmino

“The Shewanella genus – understanding an emerging human pathogen”

Supervisor: Catarina Paquete
Co-Supervisor: Mário Ramirez

Filipe Barbosa Valcovo

“Genomic characterisation of Streptococcus dysgalactiae subsp. equisimilis associated with respiratory tract infections”

Supervisor: Marcos Pinho

Isabel Moules

“Drug repurposing against malaria parasites”

Supervisor: Diana Fontinha
Co-Supervisor: Miguel Prudêncio

Catarina Rôla

“Comparative efficacy analysis of whole-sporozoite vaccines against malaria”

Supervisor: António Mendes
Co-Supervisor: Miguel Prudêncio

Maria Inês da Silva

“Deciphering the age-related lipidome of the nuclear envelope and potential molecular players in healthy ageing”

Supervisor: Maria João Sarmento
Co-Supervisor: Ana Catarina Certal

André de Oliveira Ribeiro

“Antimicrobial activity of peptide PaDBS1R3 against Gram-negative bacteria”

Supervisor: Sónia Gonçalves
Co-Supervisor: Carla Quintão

Leonor Lameira

“Unraveling the role of neutrophils during spinal cord regeneration in zebrafish”

Supervisor: Carmen de Sena Tomás
Co-Supervisor: Leonor Saúde

Patrícia Taborda

“Characterizing systemic effects following spinal cord regeneration in adult zebrafish”

Supervisor: Carmen de Sena Tomás
Co-Supervisor: Leonor Saúde

Mariana Sottomayor

“The puzzle: absence seizures, astrocyte complexity, and memory impairments”

Supervisor: Sandra Vaz

João Jesus

“Role of Astrocytes in the pathogenesis of Alzheimer’s Disease: A Narrative Review”

Supervisor: Sandra Vaz
Co-Supervisor: Joana Gonçalves-Ribeiro

Maria Filipa Porfírio

“Neural stem cells in multiple sclerosis: A_{2A} receptor as a potential target”

Supervisor: Sara Xapelli

Sara Oliveira Inteiro

“Search for novel compounds to prevent TrkB-FL cleavage”

Supervisor: Maria José Diógenes
Co-Supervisor: Francisco Enguita

Rita Amaral

“Estudo dos níveis de TrkB-ICD no sangue”

Supervisor: Maria José Diógenes
Co-Supervisor: Alexandre de Mendonça

Gonçalo Costa

“Developing a novel CNS injury model and a strategy to improve central axonal regeneration after glial scar formation”

Supervisor: Sandra Vaz
Co-Supervisor: Filipa Ferreira Ribeiro

Tomás dos Santos

“Dissecting microenvironment roadblocks to DOT-cell immunotherapy”

Supervisor: Bruno Silva-Santos
Co-Supervisor: Sofia Mensurado

Vicente Almeida

“Regulation of $\gamma\delta 17$ T cell homeostasis by stress-derived signals”

Supervisor: Julie Ribot
Co-Supervisor: Julie Darrigues

Susana do Paço

“Data Science Methods Applied to the Study of The Signature of Regulatory CD4 T Cells in the Human Thymus and its Modulation by the Chromatin Landscape”

Supervisor: Alexandre Raposo
Co-Supervisor: Mauro Castelli

Ramona Adameck

“Investigation on RANK-RANKL in the Development of Regulatory T-Cells in the Human Thymus”

Supervisor: Afonso Almeida
Co-Supervisor: Thomas Jacobs

Adriana Motta Raymundo

“Contribution of Helicobacter pylori infection to the clinical and immunological profile of Common Variable Immunodeficiency”

Supervisor: Susana L Silva
Co-Supervisor: Pedro Rosmaninho

Manuel Dias-Silva

“In vitro model to uncover new pathways of lung alveolar epithelial repair”

Supervisor: Susana M. Fernandes
Co-Supervisor: Ana Rita Carlos

Rita Diniz de Moura

“Unveiling the modulation of SAMHD1 in the differentiation of follicular helper T cells and the impact of HIV infection”

Supervisor: Ana Godinho-Santos
Co-Supervisor: Ana Espada de Sousa

Neuza Sousa

“Regulation of skeletal muscle repair by mesencephalic astrocyte-derived neurotrophic factor”

Supervisor: Pedro Sousa-Victor

Margarida Brás

“Mechanisms of immune modulation mediated by Mesencephalic Astrocyte-derived Neurotrophic Factor”

Supervisor: Pedro Sousa-Victor

Winners of the João Lobo Antunes Merit PhD Thesis Award

The winners of the 3rd edition of the João Lobo Antunes Merit PhD Thesis Award were:

**Aparajita Lahree**

Maria Mota Lab

**Cristina Ponte**

João Eurico Fonseca Lab



PhD Vivas in 2022

Catarina Lourenço

Ana Sebastião Lab

24 January

“Regulation of adenosine levels as a new therapeutic strategy for Rett Syndrome”

Supervisor: Maria José Diógenes

Ana Filipa Cardoso

Henrique Veiga-Fernandes Lab

2 February

“Regulation of type 2 innate lymphoid cells at barrier sites”

Supervisor: Henrique Veiga-Fernandes

Saumya Kumar

Luís Graça Lab

9 February

“Unveiling the regulation of germinal centre responses and antibody production by follicular T cells”

Supervisor: Luís Graça

Catarina Fonseca

Cláudio Franco Lab

25 February

“Unveiling new regulators of flow-dependent endothelial cell polarization”

Supervisor: Cláudio Franco

Marco Cavaco

Miguel Castanho Lab

23 March

“Trans-BBB peptides for targeting brain metastasis”

Supervisor: Vera Neves
Co-supervisor: Miguel Castanho

Rita Belo

Ana Sebastião Lab

20 April

“Kyotorphin as a new pharmacological therapeutic strategy for Alzheimer’s Disease”

Supervisor: Maria José Diógenes

Catarina Ferreira

Ana Sebastião Lab

17 May

“The role of septins on synaptic function and on amyloid precursor protein processing”

Supervisor: Maria José Diógenes

Adriana Temporão

Luísa Figueiredo and Miguel Prudêncio Labs

30 May

“Unravelling the role of Trypanosoma brucei proteins in the impairment of Plasmodium infection”

Supervisor: Luísa Figueiredo
Co-supervisor: Miguel Prudêncio

Gisela Gordino

Bruno Silva-Santos Lab

29 June

“Regulation of human $\gamma\delta$ T cell type 1 functional differentiation by microRNAs”

Supervisor: Julie Ribot

Idálio Viegas

Luísa Figueiredo Lab

29 June

“Role of a novel RNA modification in African trypanosomes”

Supervisor: Luísa Figueiredo

Andreia Pereira

Vanessa Morais Lab

15 July

“Unraveling the specific role of synaptic mitochondria”

Supervisor: Vanessa Morais

Rui Rodrigues

Ana Sebastião Lab

13 September

“Catalysing brain plasticity through adult neural stem cell modulation: the role of cannabinoids and neurotrophic factors”

Supervisor: Sara Xapelli

Filipe Figueiredo

Vanessa Morais Lab

14 September

“Unravelling longitudinal mitochondrial DNA mutations in Multiple Sclerosis: Association with disease activity and progression”

Supervisor: Vanessa Morais

Debanjan Mukherjee

Maria Mota Lab

4 October

“Microbiota: Understanding its role in the Host-Plasmodium affair”

Supervisor: Maria Mota

João Sabino

Sérgio de Almeida Lab

7 December

“Epigenetic reprogramming by TET enzymes impacts co-transcriptional R-loops”

Supervisor: Sérgio de Almeida

Henrique Machado

Luísa Figueiredo Lab

20 December

“Impact of adipose tissue colonization by Trypanosoma brucei during infection”

Supervisor: Luísa Figueiredo

Mariana Oliveira

João Barata Lab

22 December

“Studying the impact of interleukin-7 receptor on T-cell leukemia using zebrafish models: from basic biology to therapeutics”

Supervisor: João Barata

Winners of the Lídia Silva Santos Postdoctoral Achievement Award

The winners of the 1st edition of the Lídia Silva Santos Postdoctoral Achievement Award were:



Isaura Martins

Leonor Saúde Lab

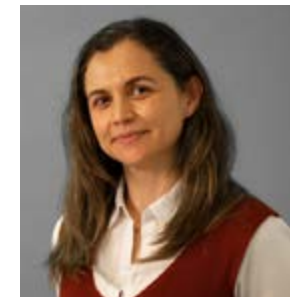
Neurosciences



Sara Silva Pereira

Luísa Figueiredo Lab

Infection
& Immunity



Rita Cascão

João Barata Lab

Cell & Molecular
Biology

Master Students

Master's Day at iMM, 23 June

This one-day event is planned and organized by the Master Students Committee to foster scientific and social networking with iMM's students and researchers. In 2022, this event included the Best Master Thesis 2020/2021 award ceremony, inspiring talks by Vanessa Zuzarte-Luís and Sérgio Dias, and a roundtable on "The different paths in Science". The afternoon session was dedicated to team building activities among the iMM Master students, followed by the monthly iMM Informal Gathering.

Master Students Committee 2022:

Daniela Botinas, Sérgio Dias Lab
Diogo Coutinho, Sérgio Dias Lab
Íris Ramos, Marc Veldohen Lab
Isa Mota, Ana Sebastião and Vanessa Morais Labs
Marta Narciso, Luísa Figueiredo Lab
Patrícia Amaral, João Barata Lab
Patrícia Tabora, Leonor Saúde Lab
Rita Lopes, Miguel Prudêncio Lab
Rúben Vilela, Luís Costa Lab
Sara Gama, João Barata Lab

Welcome Session for Master Students, 27 October

In 2022, iMM organized a new initiative to welcome the new Master Students at iMM (academic year 2022/2023). The first Welcome Session for Master Students started with a very enriching session by Leonor Saúde, Coordinator of Master Studies, about "Doing a Master at iMM", followed by the scientific presentations of the Best Master Thesis Awardees, and the testimony from two iMM Master Alumni who shared their experience at iMM and how their professional paths have been shaped by it.

PhD Students

XV CAML · V NeurULisboa PhD Students Annual Meeting, 3-6 May

This is the place by excellence where students present their work to the iMM community during three days (poster and oral communications). It also includes seminars from renowned scientists, presentations from the João Lobo Antunes Merit PhD Thesis awardees, and a graphical abstract contest. In 2022, the event included two roundtables about Inclusion & Diversity and Communication in Science.

Organizing Committee:

Anwesha Ghosh, Ana Sebastião Lab
Beatriz Gomes da Silva, Maria Carmo-Fonseca Lab
Catarina Gonçalves, Miguel Castanho Lab
Catarina Sequeira, Edgar Gomes Lab
Cristiana Morgado, Sérgio de Almeida Lab
Gonçalo Malpica, Marc Veldhoen Lab
Madalena Almeida, Sérgio de Almeida Lab
Mafalda Duque, João Barata Lab
Sara Pinto, Ana Sebastião Lab

PhD Annual Retreat, 7-8 May

During a two-day retreat, PhD students engage in scientific and group activities fostering team spirit and social interaction.

Organizing Committee:

Ana Isidro, Leonor Saúde Lab
Beatriz Silva, Claus M. Azzalin Lab
Daniela Ramalho, Cláudio Franco Lab
João Moreira, Ana Sebastião and Luísa Lopes Labs

Science Careers

“Science Careers” is a series of talks to get to know jobs in science beyond academia. During the sessions participants have the opportunity to know more about the daily work of the speakers, how they got there, the pros and cons of their work, and to ask questions about their path.

Organizing Committee:

Anwesh Ghosh, Ana Sebastião Lab
Bárbara Correia, Miguel Remondes Lab
Dalila Silva, Leonor Saúde Lab
Joana Saraiva, Luísa Lopes Lab
Mariana Costa, Leonor Saúde Lab

Pizza Seminars

Master and PhD students’ present their research work in an informal atmosphere. Happens every other Tuesday.

Organizing Committee:

João Moreira, Ana Sebastião Lab
Patrícia Campos, Marc Veldhoen Lab
Sara Paulo, Ana Sebastião Lab

PhD Students’ Representatives 2022/2023

Besides the organizing committees of the several activities, the PhD students have every year a set of representatives that act as spokesperson and liaisons of the community. Their role is crucial for the PhD community at IMM.

João Moreira, Ana Sebastião and Luísa Lopes Labs
Madalena Almeida, Sérgio de Almeida Lab

Postdocs

The Postdoctoral Association organizes several activities centered around communication and networking, aiming to build a community among the institute’s Postdoctoral researchers.

Postdoctoral Association members:

Anna Reichel, Nuno Santos Lab
Rita Cascão, João Barata Lab
Rita Fragoso, João Barata Lab
Pedro Castro, Nuno Santos Lab

Leadership and Management Skills Course, 5-7 April

Trainers:

hfp consulting, Heidelberg, Germany

Goals:

- Advance communication, collaboration, and self-organisational skills
- Understand how to reach career goals more efficiently and effectively
- Learn and practice useful tools for career in science and beyond.

Annual Postdoc Day, 29 September

The Postdoc Day is the opportunity for postdoctoral researchers to share their work with the IMM community. In 2022, the program included:

- (i) a scientific session in the morning, including short talks by 5 volunteer postdocs, followed by a seminar presented by Luisa Pinto (ICVS - UMinho, Braga);
- (ii) an afternoon session of roundtables for postdocs;
- (iii) an evening session of social gathering.

The organization of this event counted with the contribution of the volunteers Vera Neves (Miguel Castanho Lab), Valentina Riva (Claus M. Azzalin Lab) and Luca Zardoni (Claus M. Azzalin Lab).

COLife Postdoc Day, 18 November

This was a joint effort of the COLife postdoc committees (ITQB, iBET, IMM, NOVA, Champalimaud Foundation & IGC) where the postdocs from Lisbon research institutes came together to interact, connect and strengthen the community. There was a diverse program covering workshops, networking, external speakers and roundtable discussions.

Thematic sessions

The thematic sessions are informal meetings among postdocs (but not exclusively) to troubleshoot, discuss, and learn about different techniques. The 2022 sessions took place on the 1st Friday of the month and included:

- (i) “ImmunoFluorescence”, 3 June;
- (ii) “Cloning”, 8 July;
- (iii) “Sustainable Research”, 7 October, co-organized with the IMM Green Team;
- (iv) “Single Cell Sorting”, 4 November.

Officially founded in 2022, the IMM Alumni Community aims to bring together previous IMM researchers to keep them connected with the institute and with each other.

In a friendly and collaborative environment, the Alumni Community allows IMM to accompany and continue to contribute to its previous member's paths, at the same time as the Alumni can keep on sharing their knowledge and experiences with IMM's current and previous members.

By the end of 2022, the IMM Alumni Community was formed with **444 members** spread all over the world.

The majority of its members are currently practicing their activity in academia as **researchers and/or professors (61%)**. Many others have followed the industry field and are today giving their contribution to science/medical related **companies (30%)**. Some are currently providing their service as **medical doctors (7%)**, and a small minority has chosen a different path and is today working in **professional areas not related with science (2%)**.

In the first year of the IMM Alumni Community, IMM also created a monthly Alumni Newsletter, and the IMM Alumni Community official webpage, a platform where all visitors have the opportunity to discover previous IMM researchers, and to learn more about their career paths.



IMM Alumni Community

Society:

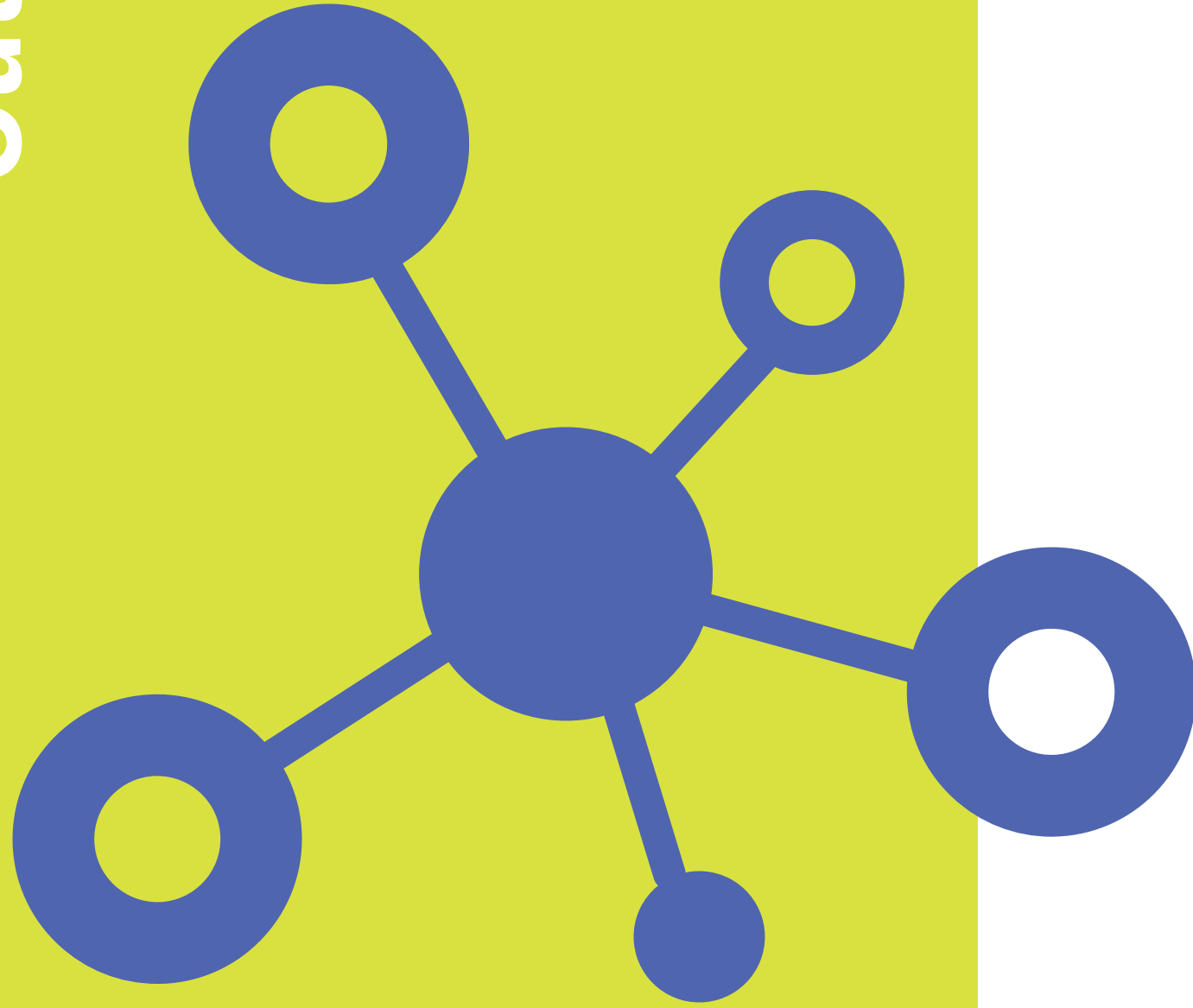
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iMM Highlights 2022



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& initiatives
- 176** Social activities

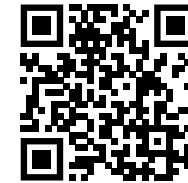
Science Outreach:



Researchers in Action for Inclusion in Science and Education - RAISE

iMM is part of a consortium - Researchers in Action for Inclusion in Science and Education (RAISE) - funded in 2022 by the European Commission. This consortium links iMM, Champalimaud Foundation, ImpactEd and Native Scientists.

RAISE aims to reach members of the society that continue to be left out or feel detached from science. It is built around an original concept of co-creation that will harmoniously blend the European Researchers Nights' activities with Researchers at School activities, such as *Cientista Regressa à Escola* and *Ciência di Noz Manera*, making the European Researchers' Night feel like a continuum of the Researchers at School programs. RAISE was funded by a Marie Skłodowska-Curie Actions and Citizens grant from the European Commission and has a duration of 2 years. During these years, iMM will be directly involved in the organization of the European Researchers' Nights held at the Champalimaud Centre for the Unknown, in Lisbon, and live-streamed. The actions will target close to 2500 underserved and/or underprivileged school students. RAISE's activities are developed with the motto "RAISE for Wellbeing. RAISE for Social Impact". The sustained collaborations and partnerships established between researchers and school students, teachers, artists and members of the public at large will contribute to a more inclusive and diverse landscape in science and education, and a more scientifically literate society in Portugal.



raise

European Researchers' Night

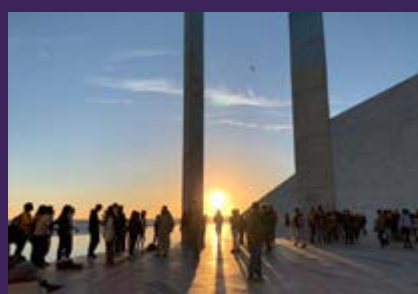
The European Researchers' Night (ERN) 2022 was the first organized by the RAISE consortium, hosted at the Champalimaud Centre for the Unknown, and joined the 49 ERNs that took place in 25 European countries on 30 September 2022.

Around 1200 people visited six different areas and, over the course of nine hours, explored a program consisting of 60 free activities: from dance to workshops, from music to hands-on science stations, from lab visits to stand-up comedy and speed dating with RiboMed scientists aboard a catamaran that linked this program to the ERN taking place at the Pavilhão do Conhecimento – Centro Ciência Viva, also in Lisbon. There were also moments of conversation, round-tables, podcasts, football and much more.

The RAISE consortium partners developed activities and programs in schools located in prioritized areas of educational action – the *Ciência de Noz Manera* (Science Our Way), run by the Champalimaud Foundation, and *Cientista Regressa à Escola* (Scientist Goes Back to School), developed by Native Scientists – and it was possible to find some of the results of the co-creation between scientists, students and teachers in the ERN program.

Almost 300 students and teachers were able to travel free of charge to the Champalimaud Foundation and participate in this ERN.

In parallel to this work carried out with schools, the organization of this event established collaborations with institutions, associations and groups of scientists, artists, athletes, communicators and educators who, like RAISE, seek to contribute to a more inclusive society.



FIC.A - International Science Festival

The COLife institutes participated in FIC.A - International Science Festival. This festival offered a program with different activities in the fields of science, technology, culture and art - including debates, talks, exhibitions, workshops, among other formats. IMM researchers participated in science stations, and the presentation of a digital game.

IMM researcher Leonor Saúde launched Neuropal - a new and free educational digital action game to teach kids from 6-11 years old about the central nervous system, while promoting safe behaviors that can prevent accidents.

The game takes us on an adventure with two friends, Neuropal and Neuro, that get separated on a tropical island when unexpected events force everyone to escape. Neuropal will have to find his friend and leave the island safely. On his way out, Neuropal will be challenged by risky situations and will have to adopt safe behaviors, avoiding injuries to himself and others.

Neuropal is available for download on the official website and is available in Portuguese, English and Spanish, and is the result of a multidisciplinary team of students and professionals from the biological sciences, science communication, computer programming, game design, and audiovisual arts.



Neuropal was co-created by IMM with Associação Viver a Ciência, FEUP and FAVO studios, and supported by “la Caixa” Foundation and Associação Nacional para a Segurança Rodoviária.



iMMagine Newsletter

In September 2022, IMM launched a monthly external newsletter, in Portuguese, that aims at sharing IMM research and accomplishments with the community. This newsletter has reached a group of 800 contacts in its early issues with an opening rate of 34% on average. Sign up to receive the iMMagine newsletter, now in bilingual mode (English and Portuguese), if you would like to have updated information on the work developed at IMM every month.



With the firm belief that science should inform decisions because it impacts everyone's lives, IMM has an extensive media presence. In 2022, there was a pronounced increase in non-COVID-19 related news compared with the previous year.

Total News 1338



307

Television



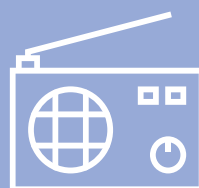
132

Newspapers/Magazines



820

Online



79

Radio

871

COVID-19 News

467

Non-COVID-19 News

“Consignação Fiscal”

For the 4th year it was possible for IMM to be part of the official list of organizations for tax return donations. The Portuguese Government provides to every taxpayers the chance to give 0,5% of their taxes to an association or private institution of public interest, without any cost while submitting their tax return.

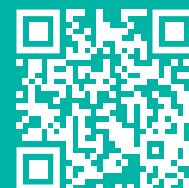
This year we decided to launch a campaign that presented IMM-Laço Hub and the Research done by this team. The subject was “Be the support that the Research in Breast Cancer needs”.

The key of this campaign is to spread the word as widely as possible. To this end a short video and other communications were made, such as postcards and digital images.

We mainly used social media and institutional contacts to advertise this campaign, which took place between April and June.

Nevertheless, trying to reach a broader audience, we repeated the approach we tried the year before, that was to address our corporate partners and ask them to disseminate the message between their employees and clients. This year we also tried a new strategy that was to send media kits to several influencers and ask them to show their followers our campaign.

[Find more](#)

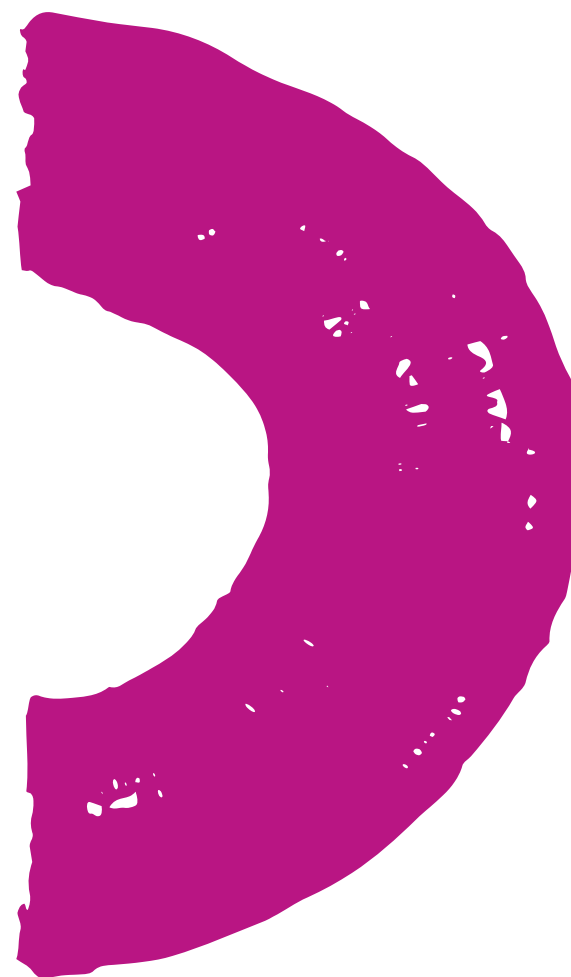


iMM-Laço Hub

2022 was the first full year of this new project that is organized in two parts that complement each other: a Breast Cancer Lab and a Science & Society team.

On the scientific side, the 1-year-old scientific project of the iMM-Laço Hub is entitled: “Multidimensional cartography of healthy, pre-malignant and malignant breast tissues: establishment of novel biomarkers predicting disease and clinical outcome and identification of potential therapeutic targets”.

Its primary goal is to create a biobank of biological samples from breast cancer patients, by establishing a platform for the collection of longitudinal clinical data and biological materials from patients over the course of their disease. Critically, in breast cancer, documentation of a complete response after neoadjuvant therapy is a major determinant of good prognosis and increased survival. Therefore, the team will study tumor samples collected at the times of diagnosis and after surgery, but also biological fluids such as blood, urine and fecal material. This is only possible due to the collaboration of several hospitals: *Hospital de Santa Maria*, Champalimaud Foundation, *CUF Descobertas*, *Joaquim Chaves Saúde* and *Hospital Beatriz Ângelo*.



The secondary goal is to characterize the crosstalk between tumor cells and their microenvironment by setting up a cutting-edge microscopy approach, recently acquired at iMM. This approach allows simultaneous detection of up to 50 biomarkers on tissue sections, and provides a more complete picture of the local tumor topography and pathophysiology. This will include a detailed characterization of immune cells and microbiota present in the tumor microenvironment. Such detailed analysis aims at identifying novel cell-to-cell interactions associated with disease recurrence/survival.

Lastly, this project is creating a simple screening method to determine how drugs/reagents affect features associated with cancer aggressiveness. This method will help patient risk stratification and treatment management.

Regarding the relationship with society, several activities were developed.

We promoted monthly visits to iMM, that were open to the general public, and consisted on a short presentation about Breast Cancer, its treatments and historic development, the state of the art and about our work in the Lab. After that the group proceeded to a visit to the Laboratory and the Biobank. In 2022 we had 26 participants in those visits.

Regarding social media we continued our work of information and awareness about breast cancer in a language that is accessible to everyone and promotes engagement. With that in mind we launched 2 new sections: the first we called it “Truth or Myth” and is a set of short videos where one of our scientists confirms a truth or deconstructs a myth related to breast cancer. The second, is a series of stories in first hand of women that went through breast cancer and shared their path. Although having a less scientific component, it brings to us, scientists, the human experience of someone who has been living with this disease.

In October - the Breast Cancer Awareness Month - many campaigns were developed with new and old corporate partners. As a result, this project had a considerable media exposure and significant funds were raised.

Institutional Partnerships:

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Ablynx
ablynx.com

AB Science
ab-science.com

Albumedix
albumedix.com

Almirall
almirall.com

Alpine Immune Sciences
alpineimmunesciences.com

AMGEN
amgen.com

Associação de Estudantes da Faculdade de Medicina da Universidade de Lisboa
aefml.pt

Astellas Farma
astellas.com.pt

Astrazeneca
astrazeneca.pt

BAYER
bayer.com

Bristol-Myers Squibb
bms.com

Bial
bial.com/pt

Celgene
celgene.com

Centro Académico de Medicina de Lisboa - Centro Hospitalar Universitário Lisboa Norte-Hospital Santa Maria
chln.min-saude.pt

CHDI Foundation
chdifoundation.org

Cruz Vermelha Portuguesa
cruzvermelha.pt

Cytokinetics
cytokinetics.com

DLA Piper
dlapiper.com

EDP Comercial
edp.pt

El Corte Inglés
elcorteingles.pt

EHDN
ehdn.org

EMBO
embo.org

European Commission
ec.europa.eu

European Research Council
erc.europa.eu

Exogenus Therapeutics
exogenus-t.com

Extrasearch SGPS SA

FairJourney Biologics
fjb.pt

Fidelidade
fidelidade.pt

FITNESS®
<https://www.nestle-cereals.com/pt/sobre-fitness>

Fluigent
fluigent.com

Fundação “la Caixa”
fundacaolacaixa.pt

Fundação Luso-Americana para o Desenvolvimento
flad.pt

Fundação para a Ciência e a Tecnologia
fct.pt

Fundação Oriente
foriente.pt

GammaDelta Therapeutics
gammadeltatx.com

Garrafeira Soares
garrafeirasoaes.pt

Genomed
genomed.pt

GSK Vaccines
gsk.com

Gilead
gilead.com

Go Natural
gonatural.pt

Health Cluster Portugal
healthportugal.com

Herdade da Malhadinha Nova
malhadinhanova.pt

Hovione
hovione.pt

illumina
illumina.com

ISDIN
isdin.com

Ionis Pharmaceuticals
ionispharma.com

Janssen
janssen.pt

Jerónimo Martins
jeronimomartins.com

La Redoute
laredoute.pt

Lilly
lilly.pt

Liga Portuguesa Contra o Cancro
ligacontracancro.pt

Lymphact

Malaria Vaccine Initiative (MVI)
malariavaccine.org

Medtronic
medtronic.pt

167

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Merck
merck.com

Merck Sharp & Dohme
msd.pt

Ministério do Trabalho,
Solidariedade e Segurança
Social
portugal.gov.pt

NOVARTIS
novartis.com

Otsuka Pharmaceutical Co, Ltd
otsuka.co.jp

Oxford Biotherapeutics
oxfordbiotherapeutics.com

Pioneer
pioneer-paper.com/pt

PFIZER
pfizer.pt

Pharmakern
kernpharma.com

PharmaMar
pharmamar.com

Proterris
proterris.com

PureTech Health
puretechhealth.com

Roche
roche.pt

RoPlaVac

Rotary Club
rotary.org

Sanofi
sanofi.pt

Semapa
semapa.pt

Servier
servier.com

Smartfreeze
smartfreeze.com

Sociedade Francisco Manuel
dos Santos

Stryker
stryker.com

Synovo
synovo.com

TargTex
targtex.com

Technophage
technophage.pt

Theranostics
thno.org

Uber
uber.com

UCB Pharma
ucb.com

United Colors of Benetton

Universidade de Lisboa
ulisboa.pt

Urban Sketchers
urbansketchers.org

V-Nano
vnanocdm.com

Women'secret
womenssecret.com



iMM is lucky to have a lively and vibrant community, made possible by the contribution of each of the members of the institute. Life at iMM is punctuated by talks, and opportunities for scientific, social and cultural discussions, countless times motivated by informal groups such as the iMM Get2gether and the GreenTeam, and the students and postdocs communities.

Seminars

Every Monday iMM receives an external speaker to share and discuss the work with the community. In 2022, we invited to iMM, researchers such as David Rowitch, Thomas R. Cech, Ricardo Henriques, Scott C. Dawson, Jordi Llop, Marco Fumasoni, Magor Lorincz, Manuel Carmo Gomes, amongst many others. These scientists have the opportunity to discuss their work in one to one meetings with group leaders at iMM, or other interested researchers, and to have a lively discussion over lunch with a group of students. iMM also receives researchers to give special seminars without a specific regularity, usually by the initiative of an internal researcher.



Within the iMM community there are also several internal seminars. Every two weeks, a group leader and a postdoc present their work in the Internal Seminar. PhD and Master students' also discuss their work every two weeks in the Pizza Seminar, a lunch break seminar series featuring drinks, pizza and fruit. Besides, most researchers have further opportunities to share their work with colleagues in seminars focused on specific research areas, such as the Parasitology, the Immunology, and the Oncobiology Clubs, and the Neurosciences and the Computational Biology and Bioinformatics Seminars.



To step out of our boxes, and foster creativity, IMM promotes a special seminar series: the Out of Our Box. In this series, IMM receives people from different areas and backgrounds, because diversity is one of the biggest driving forces for progress. In 2022, IMM's invitees were Victor Gama (musician), Desidério Murcho (philosopher), Nuno Gonçalves (SciDoArmário), Daniela Seixas (Tonic App), Martin Farley (UCL), Miguel Herdade (Ambition Institute) and Vitor Espírito Santo (Eat Just).



Daniel Seixas



Desidério Murcho



Martin Farley



Miguel Herdade



Nuno Gonçalves



Victor Gama



Vitor Espírito Santo

iMM Annual Scientific Retreat

The 2022 iMM Scientific Retreat happened on 30 June in INATEL, Costa da Caparica, and 1 July at the João Lobo Antunes Main Auditorium (iMM). This is the main event at iMM to communicate between peers and with the iMM Scientific Advisory Board. The first day included great scientific presentations by group leaders and head of facilities that led to interesting and dynamic discussions, a cocktail with a special performance by the poet Alice Neto de Sousa that left a lasting mark on all of us, followed by a dinner and party. On the second day, there were scientific talks by PhD students and postdocs and meetings with the Scientific Advisory Board. As always, there were discussions on recent scientific achievements, pertinent improvements at iMM, and ambitious future plans.



Internal Communication:

iMM intranet

In 2022, iMM created a new intranet webpage. Here, all relevant information about iMM operations is centralized, documents, and information on all the facilities and their services. This is only accessible internally and is the main tool of internal communication by the facilities.

Newsletter iMMagine

Released every Friday, at 4 pm, iMMagine is a space curated by the iMM Communication Team, to share the scientific achievements of iMMers and keep the community updated on relevant news, events, and information of all sorts. It counts with the regular participation of groups at iMM such as the Equity, Diversity and Inclusion Group column and the Green Team tips, but is also used by other people to share sporadic information.

Above all, iMMagine is a dynamic project that aims to accommodate different interests and people at iMM. For this, iMMagine comprehends different columns that change overtime. In 2022, we created the new “Molecule of the Month” by iMM researcher Francisco J. Enguita, and the seasonal playlist curated by iMM Communication Team members.



iMM is always open to groups of people that share interests and have something to share.

Now at iMM there is the Green Team, which aims at improving the institute's environmental footprint by introducing changes and informing researchers. Some initiatives by the Green Team in 2022 included participations in the internal newsletter, a special Out of Our Box seminar with Martin Farley, Sustainable Labs Manager at UCL, and the first iMM Flea Market for swap and donation of lab goods.

The Equity, Diversity and Inclusion Group has as its mission to identify, raise awareness and implement policies on Diversity and Inclusion issues. In 2022, the group created the “A-Theme-a-month initiative” that consisted of weekly articles for the internal newsletter targeting a different theme every month. This series discussed gender, sexual orientation, race, neurodiversity, parenting, accessibility and ageism, and aimed at raising awareness of issues in academia and the need to fix them to make science an inclusive place.

The Get2gether is a group at iMM with the main goal of fostering the sense of community that iMMers and iMM are fond of. They do this mainly by participating in institutional events with creative initiatives, and fostering events and other initiatives. In 2022, one of the initiatives that was idealized by this team was a Community Garden that is now a shared initiative with the *Faculdade de Medicina da Universidade de Lisboa* (FMUL). In a space just outside the iMM building, iMMers are invited to take a break from work while gardening.

This year saw the beginning of the iMM library, a physical space at iMM where people can find books in English and Portuguese, and borrow them. The first books were selected by vote open to all iMMers, and now the library is open to donations to keep on growing.

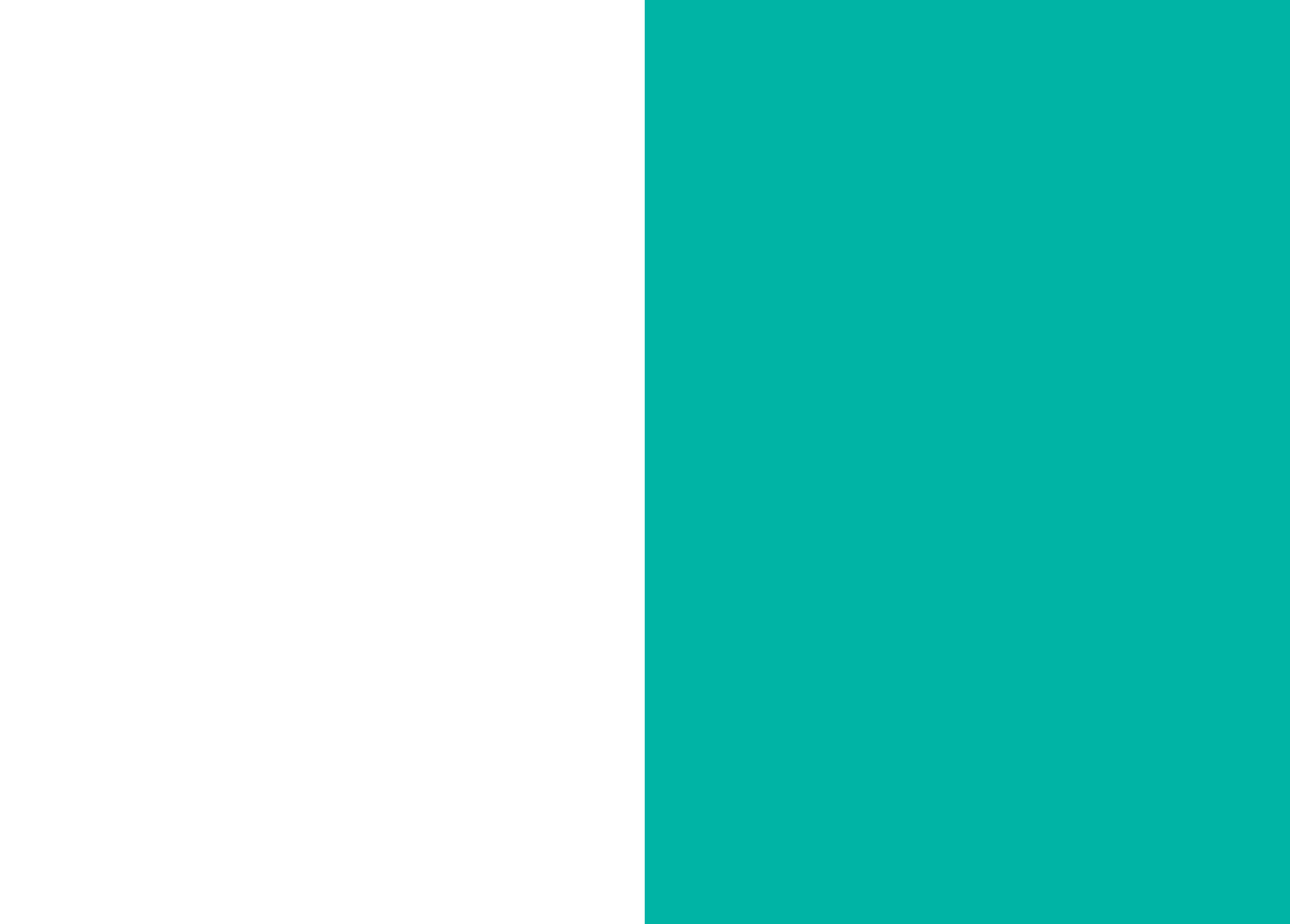
Groups at iMM & Initiatives:

In 2022, IMM was able to restart social activities that had been in a halt since 2020. We resumed the monthly Informal Gatherings that occur every last Thursday of each month, at 5pm, and join everyone at IMM for a drink on the terrace. These events are organized by different labs or groups at IMM, coordinated by the Postdoctoral Association, and are usually thematic. In 2022, we had several themes such as Pride, Halloween and the Olympic games.

In 2022, a member of IMM also started the “iMM at the Movies”. A movie screening, a dark room, popcorn and some drinks are the motto for these events, which occur every second Thursday of the month by the end of the day, and bring together all the cinephiles at IMM.

To end the year wishing for the next one to start, IMM organizes a party that occurs in December. This year, the party took place at Ferroviário, Lisbon. It’s one of the favourite moments of the year at IMM: being together, laughing, talking, dancing, and losing track of time. The party started with a review of 2022 by the Board of Directors, followed by the traditional iMM short-video competition, hosted by iMMers Lúcia Serra and Pedro Leite, with the main theme of “Perks of our home at iMM”. This was followed by a lot of fun until the end of the night.







imm.medicina.ulisboa.pt



Instituto
de Medicina
Molecular

João
Lobo
Antunes