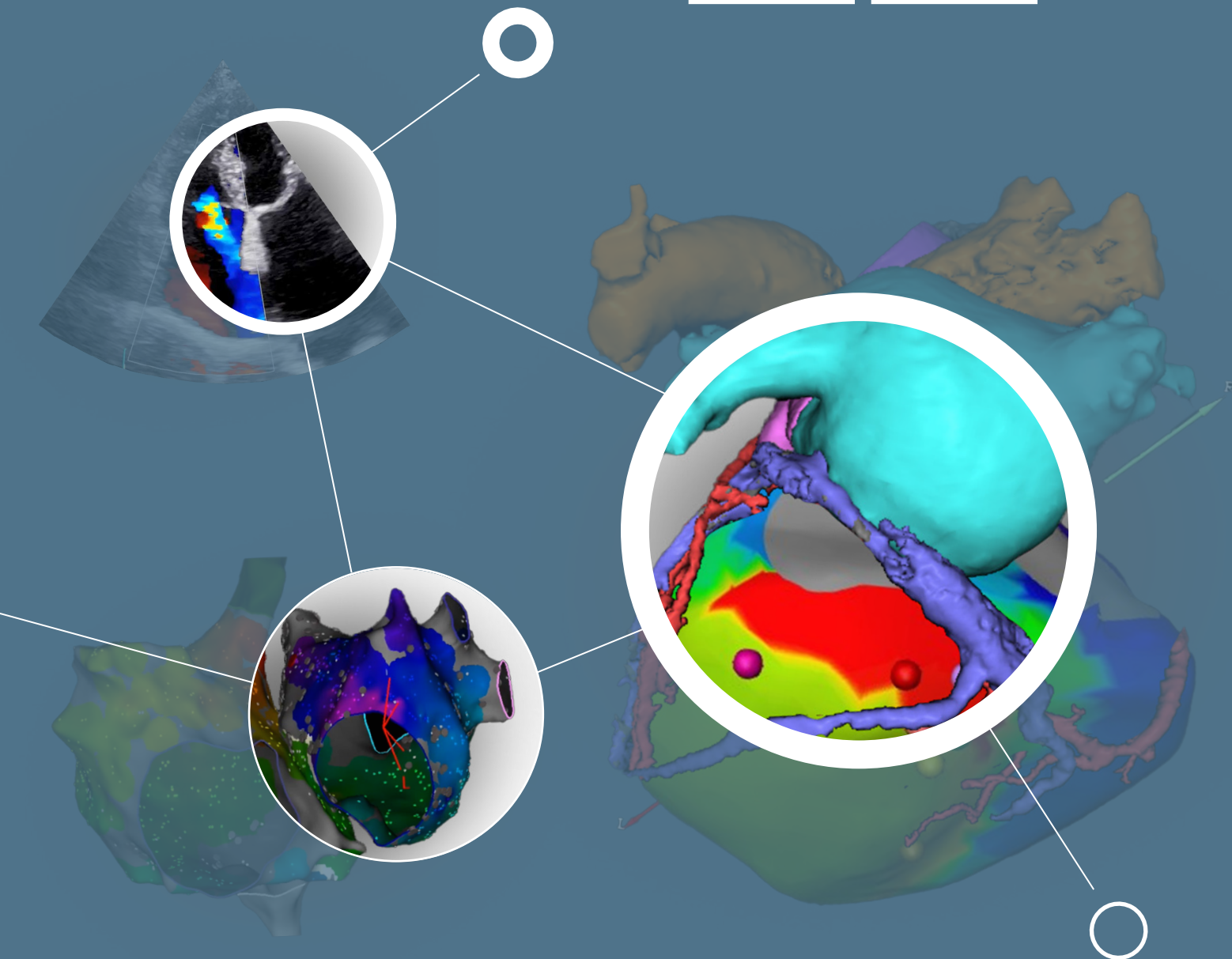


2021^b Report 22



2021^h Report 22

2021-2022 Report
**Centro Cardiovascular da
Universidade de Lisboa**



Coordination

CCUL

Design

Catarina Monteiro

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Get in touch

www.ccul.pt

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Visit us

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All the information available on the report was shared by the Researchers, facilities and services heads who we are thankful for the help.

2023



We gratefully acknowledge the Fundação para a Ciência e a Tecnologia (FCT) for funding through the grant UID 00306 – Centro Cardiovascular da Universidade de Lisboa.

6

**President's
message**

8

**Institutional
Organigram**

12

CCUL at a glance
2021 & 2022 overview

16

Research

Research Groups
Research Platforms
Clinical and Translational
Office (GAIC)
Collaborative Platform
Access to IMM Facilities
Clinical Collaborative
Departments
Inside Research Meetings
International Congress

44

**Graduate
Education
and Training**

Masters
Courses
CCUL'S PhD students

52

**Telemonitoring
Program**

54

**CCUL &
COVID-19**

56

**Knowledge
Transfer**

School Programmes
Educational Resources
Public Events
News from 2021 & 2022

70

**Peer-reviewed
publications**

President's message



Fausto J. Pinto

- Full Professor of Cardiology
- Head of the Cardiology Division and of the Heart and Vascular Department at Santa Maria Hospital, CHULN E.P.E.
- President of the World Heart Federation (WHF) (2021-2022)
- President European Society of Cardiology (ESC) (2014-2016)
- Dean of the Lisbon School of Medicine, Universidade de Lisboa (Lisbon, Portugal) (2015-2022)
- National Coordinator of the Medical Schools Council (2018-2020)
- President of the Executive Board of the Lisbon Academic Medical Centre (CAML) (2019-2021)
- Director of Lisbon Cardiovascular Institute (ICVL) (1999-2021)

The Cardiovascular Center of the University of Lisbon (CCUL) is a research centre of the Lisbon School of Medicine, Universidade de Lisboa (FMUL) and integrates the Academic Medical Center of Lisbon (CAML), together with Santa Maria University Hospital (HSM-CHULN) and the Instituto de Medicina Molecular (iMM). Since 2020 it integrates the Laboratório Associado RISE with CINTESIS, UnIC – Cardiovascular Research Unit and the CI-IPOP (IPO Porto Research Center – IPO-Porto). CCUL was founded in 1980 and from the beginning it has been dedicated to improve the understanding of basic mechanisms of cardiovascular function, in health and in disease, with the purpose of translating knowledge into improved patient care.

In 2021 and 2022, despite the COVID pandemic, several activities were kept ongoing, translated into the participation in several new projects by the different groups that are integrated in CCUL and with the publication of several papers in high impact factor journals. There was also the participation in several meetings across the globe.

The global cardiovascular disease burden has unfortunately worsening with the pandemic, due to several reasons, partially related with the changes that had to be implemented in the healthcare systems that had several unwanted consequences. These include postponing of regular health care visits during the pandemic, leading to significant delays in the detection and management of CV risk factors such as high blood pressure, diabetes, dyslipidemia, obesity and others. These disruptions have already led to an increase in acute cardiovascular events at a global level, which are responsible for the excess number of deaths that have been observed during the pandemic. COVID-19 pandemic has exponentially accelerated the uptake of digital health, creating a unique opportunity to strengthen the battle against cardiovascular disease (CVD).

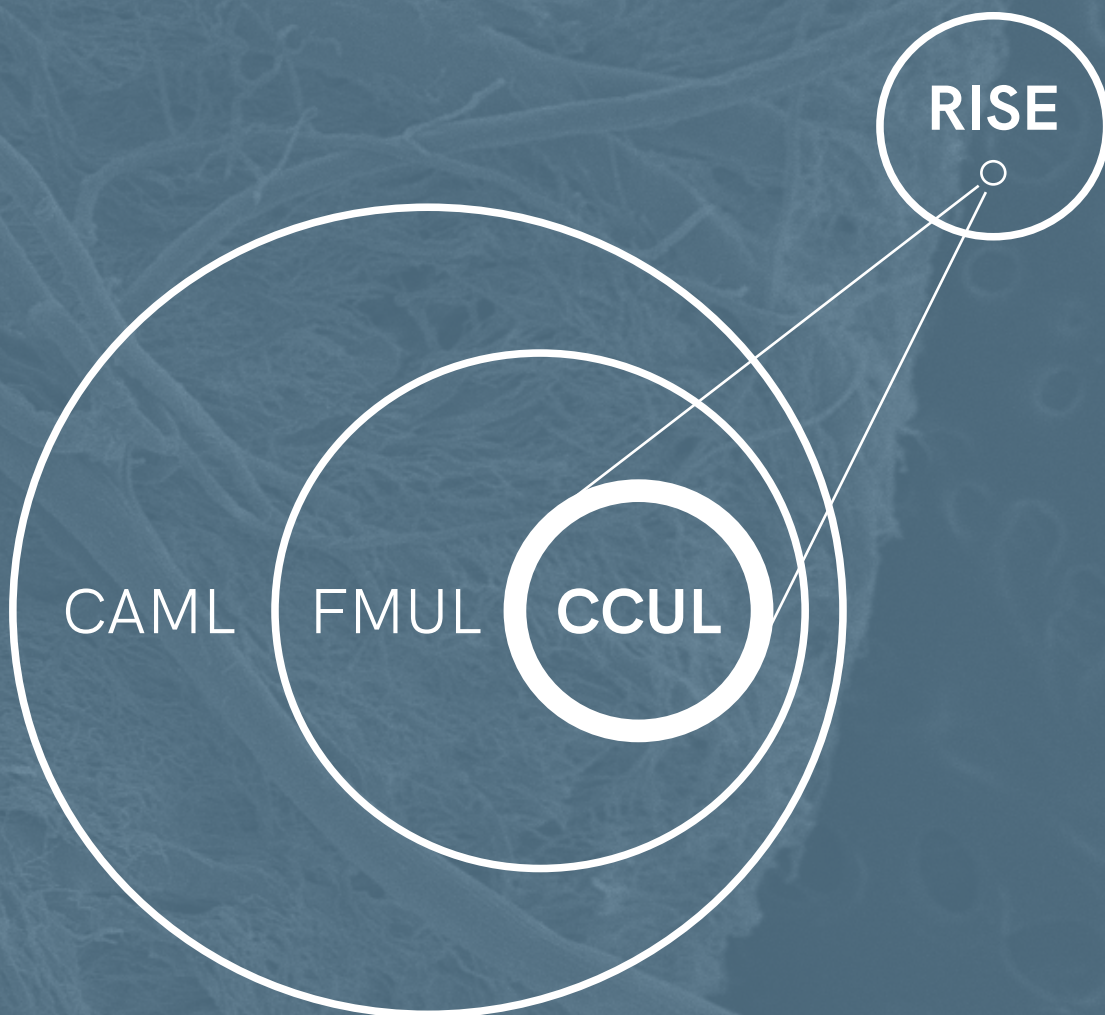
With the increasing access to the internet, and through telemedicine and artificial intelligence (AI) enabled devices, this digital transformation could be game-changing for the management of cardiovascular diseases. At CCUL we have also developed programs to reimagine the way Cardiovascular health and care can be better delivered, such as a new project on the use of remote monitoring of patients with heart failure or the implementation of a rehabilitation program totally designed to be done at home. We have also new algorithms to assess coronary artery disease and pulmonary embolism, in close collaboration with the Instituto Superior Técnico (IST).

Looking into the future we are totally committed to pursue our goals of improving cardiovascular healthcare through research, from fundamental to clinical and populational in a true spirit of open and modern positioning regarding what should be an academic research center in a large academic medical center. We will also continue to work for the future generations of researchers and clinicians to contribute to the future of cardiovascular research.

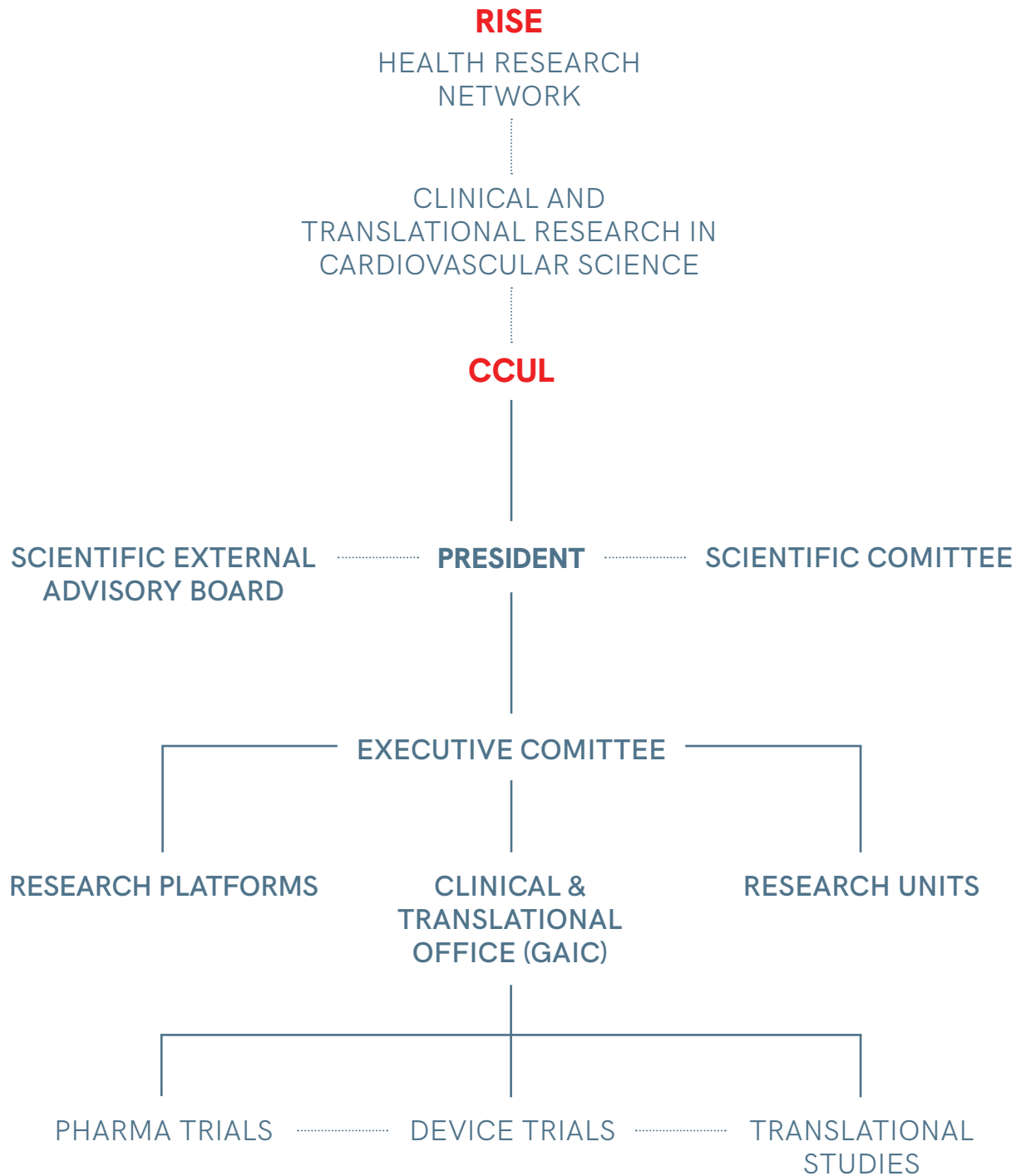
Institutional

CCUL integrates the Associated Laboratory RISE whose mission is to strengthen Health Research, from the preclinical and clinical stages to the community level, by connecting universities to healthcare providers, in the scope of the portuguese policy for Science and Technology.

As a research center of the Lisbon School of Medicine, Universidade de Lisboa (FMUL), CCUL is in the vibrant environment of the Academic Medical Center of Lisbon (CAML), also constituted by the Centro Hospitalar Universitário Lisboa Norte (CHULN, E.P.E.) and the Instituto de Medicina Molecular João Lobo Antunes (iMM).



Organigram





PRESIDENT

Pinto Fausto J. MD, PhD

EXECUTIVE COMMITTEE

Constantino Susana PhD

Executive Director

Zimbarra Cabrita Inês PhD

Co-Executive Director

Roque Isabel

Administrative Manager & Project Officer

Casaca Fátima

Executive Assistant

SCIENTIFIC EXTERNAL ADVISORY BOARD

Bax Jeroen J. MD, PhD

Leiden University Medical School
Leiden, Netherlands

Lancellotti Patrizio MD, PhD

University of Liège Hospital Center
Liège, Belgium

Zamorano J. Luis MD, PhD

University Complutense
Madrid, Spain

SCIENTIFIC COMMITTEE

Almeida Ana G. MD, PhD (Chair)

Abreu Ana MD, PhD

Azevedo Coutinho Conceição
MD, PhD

Brito Dulce MD, PhD

Caldeira Daniel MD, PhD

Fiúza Manuela MD, PhD

Mendes Pedro Luís MD, PhD

Rocha Isabel PharmD, PhD

Rosário Luís MD, PhD

de Sousa João MD



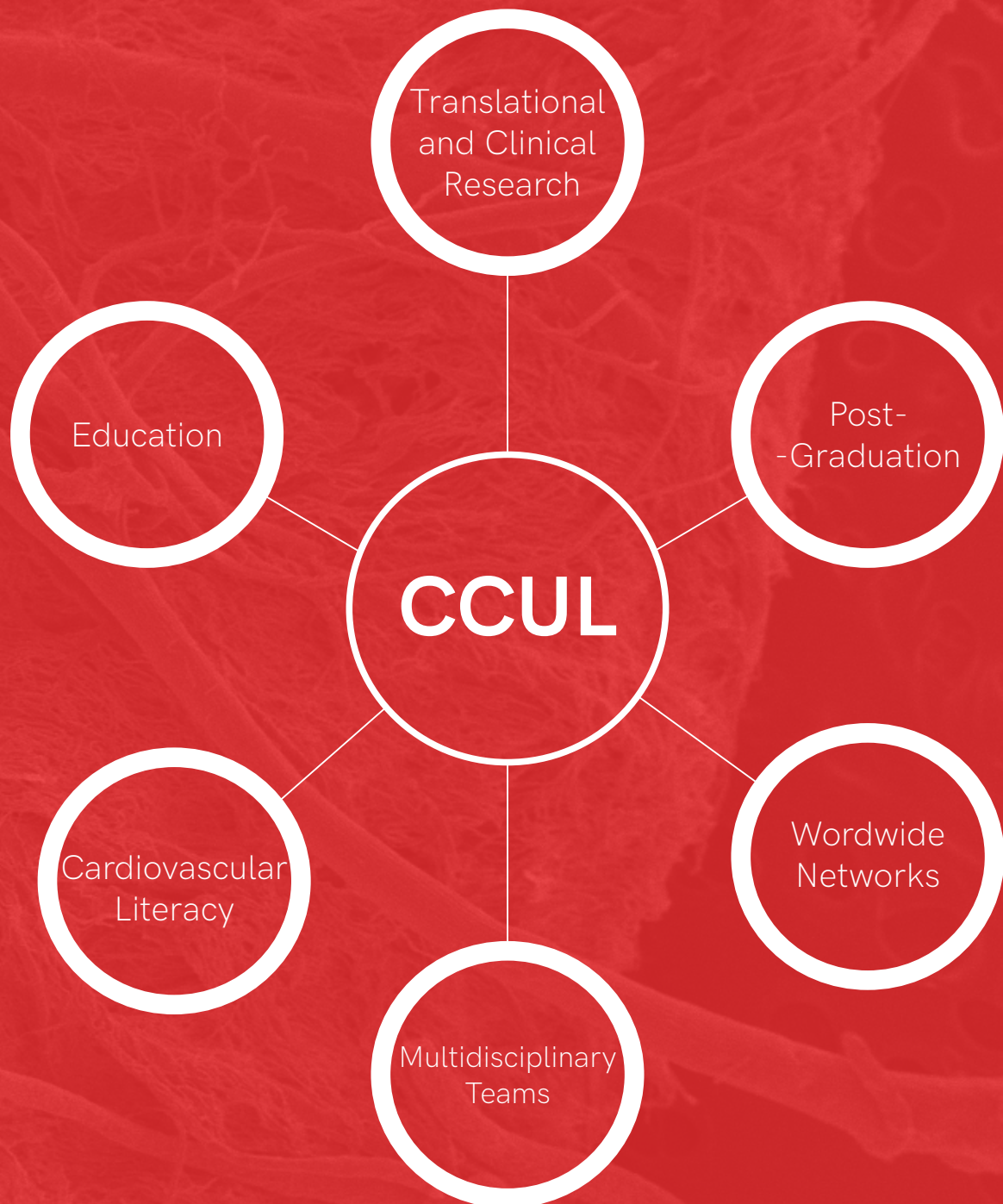
CCUL at a glance

Main goal:

— To improve the understanding of cardiovascular disease processes by following the standard of excellence in research, clinical care and medical education.

Mission:

- To promote multidisciplinary science of excellence in the Cardiovascular field;
- To provide graduate teaching education and structured training programs;
- To strengthen national collaborations to enhance competitiveness in securing national funding;
- To expand the worldwide scientific network to internationalize medicine, science, and education;
- To achieve global impact and enhance competitiveness in attracting a diverse range of research funding and researchers;
- To engage society in promoting scientific literacy and educating people to prevent and reduce cardiovascular disease.



2021 & 2022 overview



123 RESEARCHERS
64 WOMEN 59 MEN

14 RESEARCH GROUPS
GROUP LEADERS
08 WOMEN 06 MEN



42 PHD
21 WOMEN 21 MEN

13 PHD STUDENTS
06 WOMEN 07 MEN



266 PEER-REVIEWED PUBLICATIONS

2021

138 PUBLICATIONS

20 NATIONAL
118 INTERNATIONAL

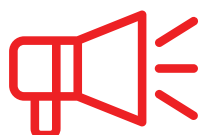
93 QUARTILE 1
17 QUARTILE 2
21 QUARTILE 3
00 QUARTILE 4
07 ND

2022

128 PUBLICATIONS

23 NATIONAL
105 INTERNATIONAL

73 QUARTILE 1
16 QUARTILE 2
27 QUARTILE 3
03 QUARTILE 4
09 ND



588 COMMUNICATIONS

2021

2022

262 COMMUNICATIONS

326 COMMUNICATIONS

139 NATIONAL

222 NATIONAL

123 INTERNATIONAL

104 INTERNATIONAL



141 CLINICAL STUDIES

2021

2022

80 CLINICAL STUDIES

61 CLINICAL STUDIES

20 CLINICAL TRIAL

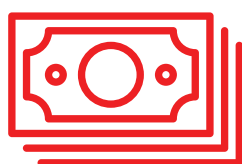
15 CLINICAL TRIAL

11 INTERVENTIONAL STUDY

08 INTERVENTIONAL STUDY

49 NON INTERVENTIONAL STUDY

38 NON INTERVENTIONAL STUDY



1.1M€

2021

2022

442.2K€ **599.1K€**

324.8K€ NATIONAL
PUBLIC AND STRUCTURAL FUNDS

300.3K€ NATIONAL
PUBLIC AND STRUCTURAL FUNDS

61.5K€ INTERNATIONAL | H2020

188.2K€ INTERNATIONAL | H2020

55.9K€ CLINICAL STUDIES

110.6K€ CLINICAL STUDIES

Research

A critical mass of dynamic and multidisciplinary researchers, organized in 14 independent groups, supported by clinical, translational, and technical platforms/departments, conduct fundamental and clinical research with a huge impact in the cardiovascular field.



Research Groups

Angiogenesis



GROUP LEADER

Susana Constantino

The main goal of our Research Unit is to study the effect of subtherapeutic and therapeutic doses of ionizing radiation in angiogenesis.

HIGHLIGHTS

- › **Translational Study in the cardiotoxic effects of Radiotherapy.** Unveiling the molecular and cellular mechanisms involved in cardiac dysfunction
- › **Project grant** to explore the synergistic interplay between low doses of ionizing radiation and biomaterials, **an innovative contribution to regenerative medicine**

MAIN PUBLICATIONS

— Ribeiro, S., Simões, A. R., Rocha, F., Vala, I. S., Pinto, A. T., Ministro, A., Poli, E., Diegues, I. M., Pina, F., Benadjaoud, M. A., Flamant, S., Tamarat, R., Osório, H., Pais, D., Casal, D., Pinto, F. J., Matthiesen, R., Fiuza, M., & Constantino Rosa Santos, S. (2022). Molecular Changes In Cardiac Tissue As A New Marker To Predict Cardiac Dysfunction Induced By Radiotherapy. *Frontiers in oncology*, 12, 945521. <https://doi.org/10.3389/fonc.2022.945521>

— Locquet, M., Spoor, D., Crijns, A., van der Harst, P., Eraso, A., Guedea, F., Fiuza, M., Santos, S. C. R., Combs, S., Borm, K., Mousseaux, E., Gencer, U., Frija, G., Cardis, E., Langendijk, H., & Jacob, S. (2022). Subclinical Left Ventricular Dysfunction Detected by Speckle-Tracking Echocardiography in Breast Cancer Patients Treated With Radiation Therapy: A Six-Month Follow-Up Analysis (MEDIRAD EARLY-HEART study). *Frontiers in oncology*, 12, 883679. <https://doi.org/10.3389/fonc.2022.883679>

— Sallam, M.; Mysara, M.; Benotmane, M.A.; Tamarat, R.; Rosa Santos, S. C.; Crijns, A.P.G.; Spoor, D.; Van Nieuwerburgh, F.; Deforce, D.; Baatout, S.; Guns, P.-J.; Aerts, A.; Ramadan, R. (2022). DNA Methylation Alterations in Fractionally Irradiated Rats and Breast Cancer Patients Receiving Radiotherapy. *International journal of molecular sciences*, 23(24), 16214. <https://doi.org/10.3390/ijms232416214>

RESEARCH TEAM



Ana Rita Pereira



Augusto Ministro



Filipe Rocha



Inês Sofia Vala



Maria Teresa Santos



Paula Oliveira



Pedro Oliveira



Sónia Ribeiro



Cardiovascular Autonomic Function



GROUP LEADER

Isabel Rocha

The Cardiovascular Autonomic Function (CAF) group at the Lisbon University, evolved from interdisciplinary collaboration to a holistic health focus. Integrating biomedical instrumentation to clinical cardiology, CAF aims to enhance health and quality of life through education, collaboration, and translational research.

HIGHLIGHTS

- › **ICU4Covid**: A Cyber-Physical System for Telemedicine and Intensive Care, H2020, grant agreement No 101016000
- › **EIT Health Ageing PhD School**: Driving innovation in healthcare for older patients

MAIN PUBLICATIONS

- Castro P, Serrador J, Sorond F, Azevedo E, Rocha I. (2022). Sympathovagal imbalance in early ischemic stroke is linked to impaired cerebral autoregulation and increased infarct volumes. *Autonomic Neurosci: basic and clinic*, 241, <https://doi.org/10.1016/j.autneu.2022.102986>
- Shvachiy L, Leal A, Outeiro TF, Rocha I, Gerales V (2022). From molecular to functional changes of different environmental lead exposure models: a comparative study. *Biology*, 11, 1164. <https://doi.org/10.3390/biology11081164>
- Meira e Cruz, M, Salles C, Seixas L, D'Elia C, Rocha I, Gozal D. (2022) COMISA In Children: A Preliminary Explorative Study, *J. Sleep Res*, e13705, <https://doi.org/10.1111/jsr.13705>.

RESEARCH TEAM



Ângela Leal



Liana Shvachiy



Maurício Machado da Rosa



Michele dos Santos Gomes da Rosa



Miguel Meira e Cruz



Mónica Ferreira



Sérgio Laranjo



Vera Gerales

Cardiovascular Exercise and Rehabilitation



GROUP LEADER
IN 2021

Ana Abreu



GROUP LEADER
IN 2022

Rita Pinto

The main goal of our Research Unit is to study the acute and chronic effects in cardiovascular disease patients attending an exercise-based cardiac rehabilitation program in central and peripheral adaptations.

HIGHLIGHTS

- › **Collaboration and participation in the EU-funded CoroPrevention project** in personalised medicine to evaluate clinical utility of personalized prevention in coronary heart disease patients
- › **Implementation of telerehabilitation exercise sessions** in a long-term basis in patients attending a cardiovascular rehabilitation program to overcome COVID-19 restrictions and other barriers

MAIN PUBLICATIONS

— Pinto, R., Pires, M. L., Borges, M., Pinto, M. L., Guerreiro, C. S., Miguel, S., ... & Abreu, A. (2022). Digital home-based multidisciplinary cardiac rehabilitation: How to counteract physical inactivity during the COVID-19 pandemic. *Revista Portuguesa de Cardiologia*, 41(3), 209-218.

— Abreu, A., Frederix, I., Dendale, P., Janssen, A., Doherty, P., Piepoli, M. F., ... & Secondary Prevention and Rehabilitation Section of EAPC. (2021). Standardization and quality improvement of secondary prevention through cardiovascular rehabilitation programmes in Europe: the avenue towards EAPC accreditation programme: a position statement of the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology (EAPC). *European journal of preventive cardiology*, 28(5), 496-509.

— Pinto, R., Melo, X., Angarten, V., Pires, M. L., Borges, M., Santos, V., Abreu, A., Santa-Clara, H. (2021). The effects of 12-months supervised periodized training on health-related physical fitness in coronary artery disease: a randomized controlled trial. *Journal of Sports Sciences*, 39(16), 1893-1902.

RESEARCH TEAM



Ana Luísa Monteiro



Ana Portela Nunes



Gonçalo de Sá



Inês Aguiar-Ricardo



Jorge Ruivo

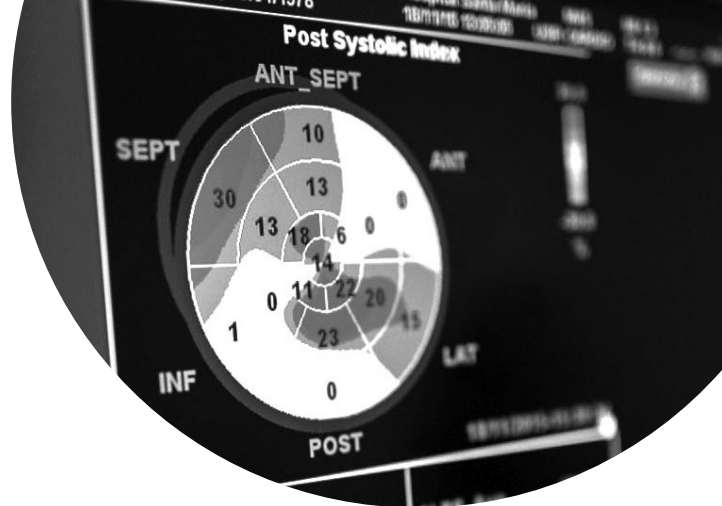


Madalena Pires



Mariana Borges

Cardiovascular Pharmacology and Therapeutics



GROUP LEADER

Daniel Caldeira

The main goal of our Research Unit is to promote the multidisciplinary integration of knowledge using epidemiological and therapeutic data in order to translate the research questions into patients' benefit and/or safety.

HIGHLIGHTS

- › **Started a new research line** based on post-hoc analysis of clinical trials and publicly available data
- › **Substantial contributions to guidelines** and expert consensus articles

MAIN PUBLICATIONS

— Katerenchuk, V., Duarte, G. S., Martins E Pereira, G., Fernandes, R. M., Ferreira, J. J., Pinto, F. J., Costa, J., & Caldeira, D. (2021). Satisfaction of Patients with Nonvitamin K Anticoagulants Compared to Vitamin K Antagonists: a Systematic Review and Meta-analysis. *Thrombosis and haemostasis*, 121(3), 366-382. <https://doi.org/10.1055/s-0040-1716752>

— Marques Antunes, M., Duarte, G. S., Brito, D., Borges, M., Costa, J., Ferreira, J. J., Pinto, F. J., & Caldeira, D. (2021). Pneumococcal vaccination in adults at very high risk or with established cardiovascular disease: systematic review and meta-analysis. *European heart journal. Quality of care & clinical outcomes*, 7(1), 97-106. <https://doi.org/10.1093/ehjqcco/qcaa030>

— Caldeira, D., & Pinto, F. J. (2021). COVID-19 and myocardial infarction. *Lancet (London, England)*, 398(10315), 1963-1964. [https://doi.org/10.1016/S0140-6736\(21\)02284-4](https://doi.org/10.1016/S0140-6736(21)02284-4)

RESEARCH TEAM



Ana Beatriz Garcia

Afonso
Nunes-Ferreira

Cláudio David



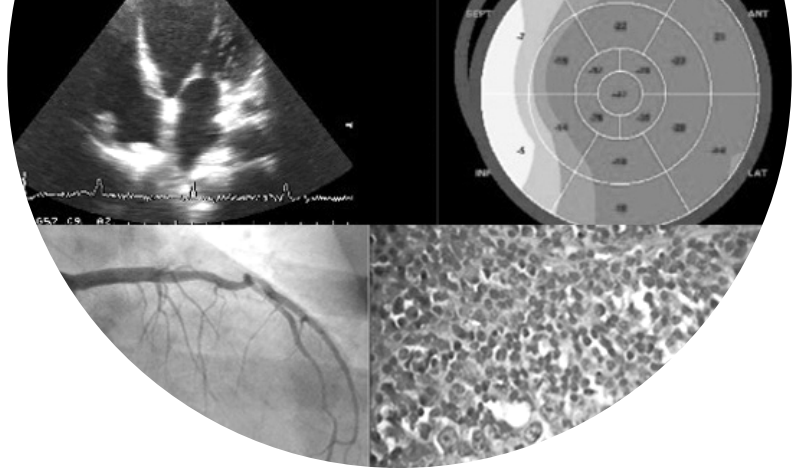
Francisca Figueiras

Miguel Marques
Antunes

Nuno Guerra



Raquel Ascensão



Cardio-Oncology



GROUP LEADER

Maria Manuela Fiuza

The main goal of our Research Unit is to develop knowledge to determine pretreatment risk, as well as serial measures of cardiovascular integrity during and in follow-up of cancer therapy.

HIGHLIGHTS

- › **BLITZ AF Cancer registry Multicenter**, non-interventional study on patients with atrial fibrillation (AF) and cancer (diagnosed within the last 3 years prior to enrollment)
- › **IV Postgraduate Update Course in Cardio-oncology - Gold Award IC-OS**: Recognition of the Cardio-Oncology Center, CAML, as a Center of Excellence by the International Cardio-Oncology Society

MAIN PUBLICATIONS

— Ribeiro, S., Simões, A. R., Rocha, F., Vala, I. S., Pinto, A. T., Ministro, A., Poli, E., Diegues, I. M., Pina, F., Benadjaoud, M. A., Flamant, S., Tamarat, R., Osório, H., Pais, D., Casal, D., Pinto, F. J., Matthiesen, R., Fiuza, M., & Constantino Rosa Santos, S. (2022). Molecular Changes In Cardiac Tissue As A New Marker To Predict Cardiac Dysfunction Induced By Radiotherapy. *Frontiers in oncology*, 12, 945521. <https://doi.org/10.3389/fonc.2022.945521>

— Locquet, M., Spoor, D., Crijns, A., van der Harst, P., Eraso, A., Guedea, F., Fiuza, M., Santos, S. C. R., Combs, S., Borm, K., Mousseaux, E., Gencer, U., Frija, G., Cardis, E., Langendijk, H., & Jacob, S. (2022). Subclinical Left Ventricular Dysfunction Detected by Speckle-Tracking Echocardiography in Breast Cancer Patients Treated With Radiation Therapy: A Six-Month Follow-Up Analysis (MEDIRAD EARLY-HEART study). *Frontiers in oncology*, 12, 883679. <https://doi.org/10.3389/fonc.2022.883679>

— Fiuza, M., Magalhães, A., Nobre Menezes, M., Costa, P., Abreu Ribeiro, L., Abreu, C., Brás, R., Vieira, J., Duarte, A. I., Morais, P., Silva, B., Costa, L., & Pinto, F. J. (2022). Clinical experience of a cardio-oncology consultation at a tertiary university hospital in Portugal: An observational study. *Revista portuguesa de cardiologia : orgao oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology : an official journal of the Portuguese Society of Cardiology*, 41(12), 979-984. <https://doi.org/10.1016/j.repc.2021.07.014>

RESEARCH TEAM



Andreia Magalhães



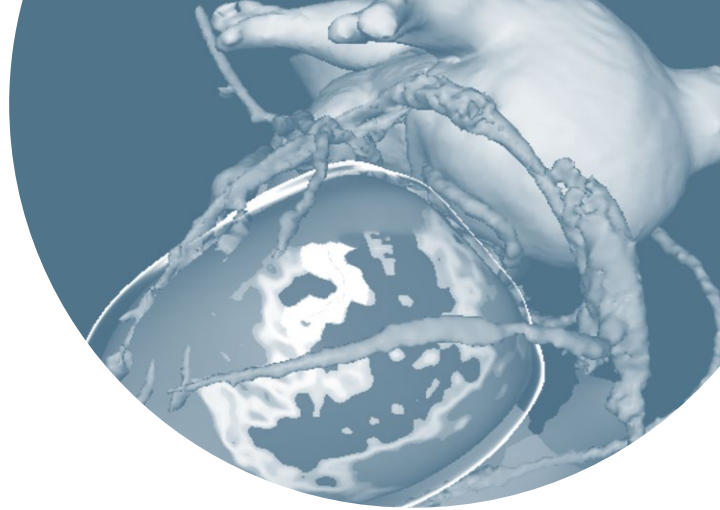
Beatriz Valente Silva



Miguel Menezes



Paula Costa Pereira



Cardiac Rhythm Abnormalities



GROUP LEADER

João de Sousa

The main goal of our Research Unit is to study the mechanisms of arrhythmic disorders with a focus on pre-procedural and intra-procedural advanced imaging modalities for high-resolution mapping guidance, aiming to increase therapeutic efficacy and safety.

HIGHLIGHTS

- › **Medtronic Award for the Best Scientific Communication** of the 2022 Arrhythmia Meeting, by the Portuguese Association of Arrhythmology, Pacing and Electrophysiology
- › **Co-authorship** of the mapping Carto software patent “Annotation of Late Potentials Comprising Local Abnormal Ventricular Activation Signals”, with Biosense Webster Inc, BIO6426USNP1

MAIN PUBLICATIONS

— Cortez-Dias, N., Lima da Silva, G., Nunes-Ferreira, A., Nakar, E., Francisco, R., Pereira, M., Carpinteiro, L., Pinto, F. J., & de Sousa, J. (2022). Novel “late potential map” algorithm: Abnormal potentials and scar channels detection for ventricular tachycardia ablation. *Journal of cardiovascular electrophysiology*, 33(6), 1211–1222. <https://doi.org/10.1111/jce.15470>

— Della Bella, P., Baratto, F., Vergara, P., Bertocchi, P., Santamaria, M., Notarstefano, P., Calò, L., Orsida, D., Tomasi, L., Piacenti, M., Sangiorgio, S., Pentimalli, F., Pruvot, E., De Sousa, J., Sacher, F., Tritto, M., Rebellato, L., Deneke, T., Romano, S. A., Nesti, M., ... Radinovic, A. (2022). Does Timing of Ventricular Tachycardia Ablation Affect Prognosis in Patients With an Implantable Cardioverter Defibrillator? Results From the Multicenter Randomized PARTITA Trial. *Circulation*, 145(25), 1829–1838. <https://doi.org/10.1161/CIRCULATIONAHA.122.059598>

RESEARCH TEAM

Afonso
Nunes-Ferreira

Andreia Magalhães

Gustavo Lima
da Silva

Inês Aguiar-Ricardo



Joana Brito



Nelson Cunha



Nuno Cortez-Dias



Pedro Marques

Pedro Silvério
António

Sara Couto Pereira

Heart Failure and Cardiomyopathies



GROUP LEADER

Dulce Brito

The work of our Research Unit is based in three main goals: To study the genetic basis of cardiomyopathies, genotype-phenotype associations and sudden death risk; To link specific cardiomyopathies to heart failure phenotypes, tailoring therapeutic approaches; To use remote telemonitoring for better care and outcomes in severe heart failure and cardiomyopathies.

HIGHLIGHTS

- › **“La Caixa” Foundation Research Grant** for the project “RNA mis-splicing in hypertrophic cardiomyopathy: opportunities for diagnosis and therapy”
- › **8 Book Chapters’ authorship**, including “Telemonitoring in Cardiac Failure”, in: A Century of Telemedicine: Curatio Sine Distantia at Tempora. A World Wide Overview. Part V. Sofia, Bulgaria, Editors M. Jordanova, F. Lievens, 2022, Pgs. 68–79. ISBN 978–619–90601–6–2.

MAIN PUBLICATIONS

- Garcia-Pavia, P., Bengel, F., Brito, D., Damy, T., Duca, F., Dorbala, S., Nativi-Nicolau, J., Obici, L., Rapezzi, C., Sekijima, Y., & Elliott, P. M. (2021). Expert consensus on the monitoring of transthyretin amyloid cardiomyopathy. *European journal of heart failure*, 23(6), 895–905. <https://doi.org/10.1002/ehfj.2198>
- Silva-Cardoso, J., Fonseca, C., Franco, F., Morais, J., Ferreira, J., & Brito, D. (2021). Optimization of heart failure with reduced ejection fraction prognosis-modifying drugs: A 2021 heart failure expert consensus paper. *Revista portuguesa de cardiologia*, 40(12), 975–983. <https://doi.org/10.1016/j.repce.2021.11.017>
- Lopes, L. R., Losi, M. A., Sheikh, N., Laroche, C., Charron, P., Gimeno, J., Kaski, J. P., Maggioni, A. P., Tavazzi, L., Arbustini, E., Brito, D., Celutkienė, J., Hagege, A., Linhart, A., Mogensen, J., Garcia-Pinilla, J. M., Ripoll-Vera, T., Seggewiss, H., Villacorta, E., Caforio, A., ... Cardiomyopathy Registry Investigators Group (2022). Association between common cardiovascular risk factors and clinical phenotype in patients with hypertrophic cardiomyopathy from the European Society of Cardiology (ESC) EurObservational Research Programme (EORP) Cardiomyopathy/Myocarditis registry. *European heart journal. Quality of care & clinical outcomes*, 9(1), 42–53. <https://doi.org/10.1093/ehjqcco/qcac006>

RESEARCH TEAM



Afonso
Nunes-Ferreira



Doroteia Reis Silva



Hugo Madeira



Inês Aguiar-Ricardo



Joana Rigueira



João Agostinho



Mónica Mendes
Pedro



Nelson Pires da
Cunha



Oana Moldovan



Rafael Santos

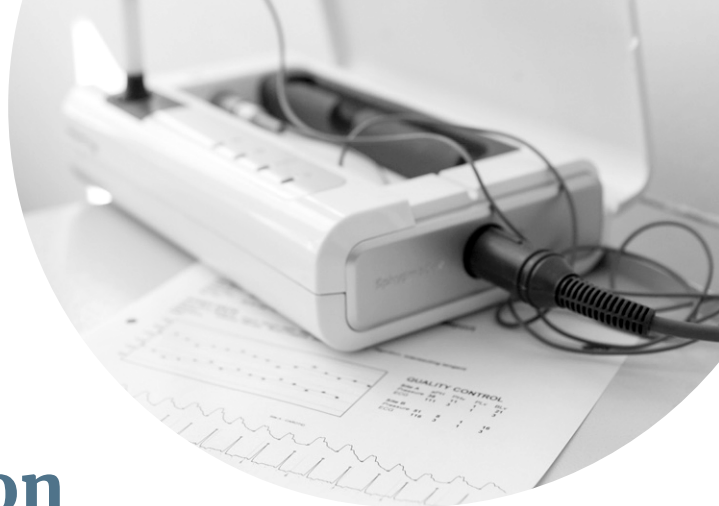


Tatiana Guimarães



Tiago Rodrigues

Hypertension and Cardiovascular Neuronal Dysfunction



GROUP LEADER

Carlos Moreira

The main goal of the Unit is to study cardiovascular risk in various pathologies, in particular hypertension, but also covering diabetes mellitus, obesity and metabolic diseases.

HIGHLIGHTS

- › **Development of innovative strategies** to determine cardiovascular risk
- › **Hypertension Course for clinics**

MAIN PUBLICATIONS

— Silva Ferreira, J., Silva, A., Alcântara, P., Moreira, C. (2022). Clinical Significance of Pulse Wave (PWV) Analysis in Heart Failure. 16º Congresso Português de Hipertensão e Risco Cardiovascular

— Gouveia T., Camacho M., Alcântara C., Alcântara P., Moreira C. (2022). Variação da onda de pulso após introdução ARNI (2022). 28º Congresso Nacional de Medicina Interna

RESEARCH TEAM



Ana Paula Alcântara



Cristina Alcântara



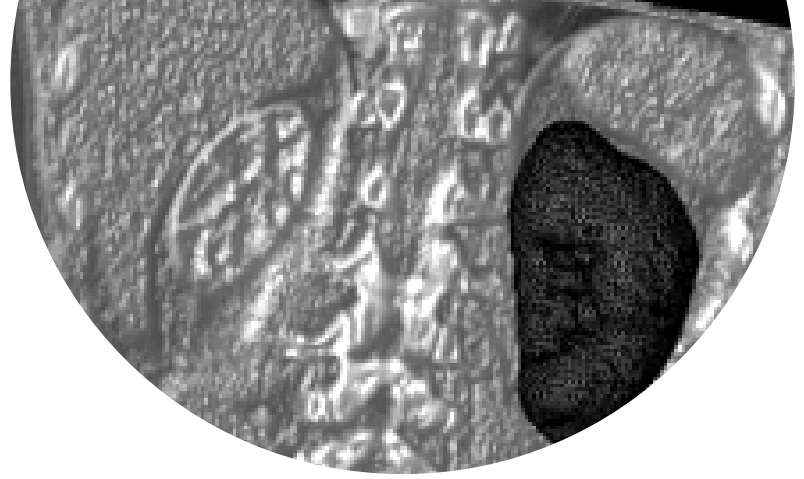
Inês Fonseca



Milton Nascimento



Patrício Ricardo Aguiar



Nephrology



GROUP LEADER
Edgar Almeida

Chronic kidney disease (CKD) is a major problem in Portugal and our research aims to ascertain which are the contributors to progression and other complications of this condition. Acute kidney injury and hereditary nephropathies are deeply related to CKD.

HIGHLIGHTS

- › **2022 ANADIAL Award** – “Validation of the kidney failure risk equation in a Portuguese cohort”
- › **2021 ANADIAL Honorable Mention** – “Incidence, prevalence and crude survival of patients starting dialysis in Portugal”

MAIN PUBLICATIONS

- Vanholder, R., Rondeau, E., Anders, H. J., Carlson, N., Fliser, D., Kanbay, M., Lopes, J. A., Murray, P. T., Ortiz, A., Sanz, A. B., Selby, N. M., Wiecek, A., & Massy, Z. A. (2022). EDTAKI: a Nephrology and Public Policy Committee platform call for more European involvement in acute kidney injury. *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association*, 37(4), 740-748. <https://doi.org/10.1093/ndt/gfab018>
- Baptista, R. B., & Almeida, E. (2021). The emerging challenge of sickle cell nephropathy. *Nephrology Dialysis Transplantation*, 36(5), 779-781. <https://doi.org/10.1093/ndt/gfz197>
- de Almeida, E. A. F., Raimundo, M., Coelho, A., & Sa, H. (2021). Incidence, prevalence and crude survival of patients starting dialysis in Portugal (2010-16): analysis of the National Health System individual registry. *Clin Kidney J*, 14(3), 869-875. <https://doi.org/10.1093/ckj/sfaa023>

RESEARCH TEAM



José António Lopes

Paramyloidosis



GROUP LEADER

Conceição Coutinho

The main goal of our research group is to use a multimodality imaging protocol for the early diagnosis of cardiac involvement in transthyretin amyloidosis (ATTR) V30M - a progressive and fatal disease with a high prevalence in Portugal and for whom several promising therapies are in progress.

HIGHLIGHTS

› **Research award in myocardial and pericardial diseases** of the Portuguese Society of Cardiology 2022: Diagnostic and prognostic contribution of 99mTc-DPD-TC scintigraphy in transthyretin V30M cardiac amyloidosis

MAIN PUBLICATIONS

— Azevedo Coutinho, M. D. C., Cortez-Dias N., Cantinho, G., Gonçalves, S., Cunha, N., Rodrigues, T., Santos, L., Conceição, I., Pinto, F. J. (2021). Diagnostic and prognostic contribution of 99mTc-DPD scintigraphy in transthyretin V30M cardiac amyloidosis. European Heart Journal, 42 (Supplement 1). <https://doi.org/10.1093/eurheartj/ehab724.0278>

RESEARCH TEAM



Guilhermina
Cantinho



Isabel Conceição



Laura Santos



Nuno Cortez-Dias



Pedro Marques



Susana Gonçalves

Structural and Coronary Heart Disease



GROUP LEADER
Fausto J. Pinto

The main goal of our Research Unit is to improve knowledge and develop innovation in the field of structural heart disease, particularly in valvular heart disease, and in coronary artery disease, either in the mechanisms of disease as well in improving diagnosis and management of these different conditions.

HIGHLIGHTS

- › Development of important clinical studies, such as **ZEUS trial** and **ISCHEMIA study**
- › Development of studies using **artificial intelligence**, such as to improve **assessment of coronary angiography**.

MAIN PUBLICATIONS

— Vamvakidou, A., Annabi, M. S., Pibarot, P., Plonska-Gosciniak, E., Almeida, A. G., Guzzetti, E., Dahou, A., Burwash, I. G., Koschutnik, M., Bartko, P. E., Bergler-Klein, J., Mascherbauer, J., Orwat, S., Baumgartner, H., Cavalcante, J., Pinto, F., Kukulski, T., Kasprzak, J. D., Clavel, M. A., Flachskampf, F. A., ... Senior, R. (2021). Clinical Value of Stress Transaortic Flow Rate During Dobutamine Echocardiography in Reduced Left Ventricular Ejection Fraction, Low-Gradient Aortic Stenosis: A Multicenter Study. *Circulation. Cardiovascular imaging*, 14(11), e012809. <https://doi.org/10.1161/CIRCIMAGING.121.012809>

— Hecht, S., Butcher, S. C., Pio, S. M., Kong, W. K. F., Singh, G. K., Ng, A. C. T., Perry, R., Poh, K. K., Almeida, A. G., González, A., Shen, M., Yeo, T. C., Shanks, M., Popescu, B. A., Gay, L. G., Fijałkowski, M., Liang, M., Tay, E., Marsan, N. A., Selvanayagam, J., ... Pibarot, P. (2022). Impact of Left Ventricular Ejection Fraction on Clinical Outcomes in Bicuspid Aortic Valve Disease. *Journal of the American College of Cardiology*, 80(11), 1071-1084. <https://doi.org/10.1016/j.jacc.2022.06.032>

— Ferreira, R., Rua, N., Sena, A., Velho, T. R., Gonçalves, J., Junqueira, N., Almeida, A. G., Nobre, Â., & Pinto, F. (2022). Sutureless bioprosthesis for aortic valve replacement: Surgical and clinical outcomes. *Journal of cardiac surgery*, 37(12), 4774-4782. <https://doi.org/10.1111/jocs.17113>

RESEARCH TEAM



Ana Rita Francisco



Ângelo Nobre



Beatriz Valente Silva



Catarina Sousa



Cláudia Jorge



Fernando Ribeiro



Helder Pereira



Helena Santiago



João Silva Marques



Luís Brás-Rosário



Miguel Menezes



Pedro Cardoso



Ricardo Ferreira



Sara Correia



Sérgio Batista



Tiago Rodrigues

Valvular Heart Disease and Pulmonary Hypertension



GROUP LEADER
Ana Almeida

We study novel insights into valve cell biology and tissue architecture, new mathematical models of valve geometry, 4-D flow mechanics, myocardial fibrosis and disarray, impact on prognosis of novel preventive and therapeutic measures. Biomarkers, imaging and intervention techniques are assessed.

HIGHLIGHTS

- › **Prognosis of bicuspid aortic valve** – From genetics to imaging
- › **New biomarkers** in pulmonary hypertension
- › **Epidemiology** of infective endocarditis

MAIN PUBLICATIONS

— Elvas, L. B., Almeida, A. G., Rosario, L., Dias, M. S., & Ferreira, J. C. (2021). Calcium Identification and Scoring Based on Echocardiography. An Exploratory Study on Aortic Valve Stenosis. *Journal of personalized medicine*, 11(7), 598. <https://doi.org/10.3390/jpm11070598>

— Vamvakidou, A., Annabi, M. S., Pibarot, P., Plonska-Gosciniak, E., Almeida, A. G., Guzzetti, E., Dahou, A., Burwash, I. G., Koschutnik, M., Bartko, P. E., Bergler-Klein, J., Mascherbauer, J., Orwat, S., Baumgartner, H., Cavalcante, J., Pinto, F., Kukulski, T., Kasprzak, J. D., Clavel, M. A., Flachskampf, F. A., ... Senior, R. (2021). Clinical Value of Stress Transaortic Flow Rate During Dobutamine Echocardiography in Reduced Left Ventricular Ejection Fraction, Low-Gradient Aortic Stenosis: A Multicenter Study. *Circulation. Cardiovascular imaging*, 14(11), e012809. <https://doi.org/10.1161/CIRCIMAGING.121.012809>

— Sousa, C., Nogueira, P., & Pinto, F. J. (2021). Insight into the epidemiology of infective endocarditis in Portugal: a contemporary nationwide study from 2010 to 2018. *BMC cardiovascular disorders*, 21(1), 138. <https://doi.org/10.1186/s12872-021-01937-3>

RESEARCH TEAM



Ângelo Nobre



Catarina Sousa



Cláudio David



Luís Brás-Rosário



Nuno Lousada



João Agostinho



Paula Fazendas



Pedro Carrilho-Ferreira



Ricardo Ferreira



Rui Plácido



Susana Gonçalves



Susana Martins



Vascular Biology, Imaging and Surgery



GROUP LEADER

Luís Mendes Pedro

The main goal of our Research Unit is to contribute for a better knowledge of aortic and peripheral vascular diseases. We take advantage of the large clinical experience and workload of the CHULN vascular surgery department as well as the expertise in the management of complex vascular diseases.

HIGHLIGHTS

- › **Multicentric collaborations in complex aortic disease studies**, namely the: Multicenter study on endovascular aortic arch repair using the Bolton Relay Branch system.
- › Collaborations with the **Internacional Aortic Research Consortium**
- › **Two prize winners at the XXI SPACV Congress:** Ryan Gouveia e Melo with the best young oral presentation award for the study and Alice Lopes with the best Review paper published

MAIN PUBLICATIONS

— Gouveia, E. M. R., Fernandes, E. F. R., Salvado, M., Duarte, A., Lopes, A., Verhoeven, E., Fernandes, E. F. J., & Mendes Pedro, L. (2022). The Impact of the Proctor Assistance for a Safe Learning Curve in the Development of a Complex Aortic Endovascular Program. *J Endovasc Ther*, 31(1), 26-36. <https://doi.org/10.1177/15266028221105186>

— Gouveia, E. M. R., Mourao, M., Caldeira, D., Alves, M., Lopes, A., Duarte, A., Fernandes, E. F. R., & Mendes Pedro, L. (2022). A systematic review and meta-analysis of the incidence of acute aortic dissections in population-based studies. *J Vasc Surg*, 75(2), 709-720. <https://doi.org/10.1016/j.jvs.2021.08.080>

— Gouveia, E. M. R., Silva Duarte, G., Lopes, A., Alves, M., Caldeira, D., Fernandes, E. F. R., & Mendes Pedro, L. (2022). Incidence and Prevalence of Thoracic Aortic Aneurysms: A Systematic Review and Meta-analysis of Population-Based Studies. *Semin Thorac Cardiovasc Surg*, 34(1), 1-16. <https://doi.org/10.1053/j.semtcvs.2021.02.029>

RESEARCH TEAM



Alice Lopes



Augusto Ministro



Gonçalo Sobrinho



Pedro Miguel Amorim



Ruy Fernandes e Fernandes



Ryan Gouveia e Melo

Cardiovascular Disease and Regeneration



GROUP LEADER
Anabela Bensimon-Brito*

The main goal of our Research Unit is to understand the mechanisms of cardiac valve regeneration using zebrafish as a model.

HIGHLIGHTS

- › **New model for *in vivo* imaging** of cardiac valve regeneration during development
- › **New approaches for 3D analysis** of zebrafish adult hearts

MAIN PUBLICATIONS

— Cardeira-da-Silva, J., Bensimon-Brito, A., Tarasco, M., Brandão, A. S., Rosa, J. T., Borbinha, J., Almeida, P. J., Jacinto, A., Cancela, M. L., Gavaia, P. J., Stainier, D. Y. R., & Laizé, V. (2022). Fin ray branching is defined by TRAP+ osteolytic tubules in zebrafish. *Proceedings of the National Academy of Sciences of the United States of America*, 119(48), e2209231119. <https://doi.org/10.1073/pnas.2209231119>

— Bensimon-Brito, A., Boezio, G. L. M., Cardeira-da-Silva, J., Wietelmann, A., Ramkumar, S., Lundegaard, P. R., Helker, C. S. M., Ramadass, R., Piesker, J., Nauwerth, A., Mueller, C., & Stainier, D. Y. R. (2022). Integration of multiple imaging platforms to uncover cardiovascular defects in adult zebrafish. *Cardiovascular research*, 118(12), 2665–2687. <https://doi.org/10.1093/cvr/cvab310>

RESEARCH TEAM



Inês Cristo



Ana Beatriz Barbosa

*This Research unit is supervised by Anabela Bensimon-Brito, group leader at the Marseille Medical Genetics Center. Projects co-supervised by Inês Cristo.

Research Platforms

Cardiomics

The cardiomics laboratory is applying a multi-disciplinary approach using structural biology, biochemistry, genetics and bioinformatics to unravel the role of non-coding RNAs in cardiovascular diseases. It is currently investigating the use of circulating miRNAs as biomarkers of cardiac diseases including infarction and atrial fibrillation, the physiological role of miRNAs in rare diseases such as Fabry's disease, and the involvement of non-coding RNAs as regulators of heart misfunction.

Molecular Biology Lab

The molecular biology laboratory is currently equipped with all facilities to carry out standard molecular biology techniques such as DNA extraction, polymerase chain reactions (PCR), gel electrophoresis, protein extraction and western-blot, zymography, enzyme and Elisa assays. A Laser Capture Microdissection (LCM) microscope enables users to isolate specific single cells or entire areas of tissue to be used in genomics (DNA), transcriptomics (mRNA, miRNA), proteomics or metabolomics.

Cell Culture Lab

The cell culture lab provides various resources for the isolation and culture of animal and human cells. The cultured cells are used for research work (molecular assays) or in vivo studies using different animal models.

The cell culture lab is equipped with CO₂ heated incubators, laminar flow hoods, microscope for viewing cell cultures, centrifuge, freezers (-20° °C and - 80 °C) and a cryogenic tank.

Exercise and Cardiovascular Rehabilitation Lab

The Exercise and Cardiovascular Rehabilitation Laboratory is currently equipped with all top technology facilities to evaluate non-invasively parameters of functional cardiorespiratory and cardiac segmental and global function by echocardiographic imaging, at rest and with exercise using different methods: bicycle and treadmill. It also allows the evaluation of muscle strength, flexibility and coordination.

It is ideal to join in the same laboratory the possibility to evaluate at the same time peripheral and central cardiovascular system in humans, patients, apparently healthy individuals and athletes.





Small Animal Experimental Lab

The Small Animal Experimental Laboratory is dedicated to experimental procedures on rodents performed according to Directive 2010/63/ EU, operated by qualified staff and with very strict rules, respecting all animal welfare principles and the 3R policy. All the procedures should be approved by the institutional Animal Welfare Body, licensed by DGAV, the Portuguese competent authority for animal protection. The purpose of this facility is to support the development of experimental models invaluable for the study of cardiovascular disfunctions and it aims to disclose new therapeutic and life-quality improving approaches.

Laser Doppler Perfusion Imager

The Laser Doppler Imager offers a well-proven, high specification to evaluate blood flow for clinical or research applications. It is optimized for small-area pre-clinical assessments.

Echocardiography

Echocardiography allows for rapid and comprehensive evaluation of myocardial function, valvular and vascular structure in animal models. This form of non-invasive assessment is ideal for performing serial evaluations of cardiac function or real-time monitoring during and after pharmacological or therapeutic intervention.

Sleep Unit

The Sleep Unit is a specialized functional department of CCUL pursuing some well-defined goals oriented to develop independent clinical research and to support collaborative work in basic science related to Clinical Chronobiology and Sleep Medicine.



Clinical and Translational Office (GAIC)

The Cardiovascular Research Support Unit (Gabinete de Apoio à Investigação Cardiovascular - GAIC), created in 2012 by Professor Fausto Pinto, is a department at the Association for Research and Development of the Faculty of Medicine (AIDFM), a public benefit association that promotes biomedical research at FMUL. GAIC was created to serve as a platform for cardiovascular (CV) researchers and collaborators within the Lisbon Academic Medical Centre (CAML) and the Heart and Vessels Department of the Centro Hospitalar Lisboa Norte, EPE (CHULN). With a team of experienced Clinical Research Coordinators (CRCs), fully dedicated to managing more than 100 clinical research studies, the main activities of GAIC are as follows: to support operationally the clinical research activity, to coordinate and implement clinical research studies, interventional and non-interventional; to ensure database and reports management of CV scientific activity; to develop guidance documents (procedures / standard operations) for the conduction of research according to Good Clinical Practice and Regulatory requirements.

www.gaic.pt

Translational studies

10 NATIONAL FCT
05 INTERNATIONAL
04 HORIZON 2020
01 LACAIXA

Pharma studies

20 MULTICENTER

Devices studies

08 MULTICENTER

GAIC MANAGEMENT TEAM

Fausto J Pinto Scientific Director

Inês Zimbarra Cabrita Chief Scientific Officer

Cecília Gomes GAIC Chief Coordinator



2021 & 2022 highlights

› 2021

Even with the impact of COVID-19, **GAIC maintained all the ongoing studies** and still managed to increase activity.

› **International Top Recruiters** in Pulmonary Arterial Hypertension Trials – PI Dr. Rui Plácido.

› Considered **one of the top investigation centers** for clinical studies in Portugal.

› 2022

Significant growth with 111 Clinical Studies, of which 70 were Industry Sponsored, 23 were Investigator Driven Research and 18 were Site Investigators Driven Research.

› GAIC was present in **various international investigator meetings**.



Collaborative Platform

CETERA Academic Consulting Research Organization

CETERA is a Portuguese Academic Consulting Research Organization (CRO) and an autonomous department of the Association for Research and Development of the Faculty of Medicine (AIDFM), founded in 2013 and based at the Lisbon Academic Medical Centre (CAML). A key strength of CETERA is its scientific team's academic expertise and integrity, which lies in global coverage with different stakeholders. CETERA provides a full range of services considering study management and monitoring of clinical research, including Clinical trials, interventional and non-interventional studies, and investigator-driven studies funded by unrestricted industry grants in collaboration with FMUL.

The main fields of interest are life sciences, cardiovascular (drug development and devices), pediatrics, neurology, rheumatology, ophthalmology, and gastroenterology. Our services include clinical research management and monitoring, regulatory support, patient recruitment and retention strategies, decentralized trials (DCT) management, clinical and scientific advisory, translation services, and the project management of European-funded projects. Our service portfolio is guided by high-quality standards to ensure compliance with national and international regulations and contribute to the research activity's transparency and operational excellence.

CETERA site network includes more than 25 research centers and more than 20 primary care units across the country. CETERA has a network of more than 30 national and international partnerships, more than 350 researchers involved, and more than 3.500 participants included in their studies. CETERA is part of ECRIN as a clinical trial unit and collaborates with the Portuguese national partner PtCRIN.

CETERA has been involved in several training and education programs collaborating since 2021 in the scientific coordination and implementation of the Clinical Research Master's degree from the Lisbon School of Medicine, promoting several initiatives such as seminars and a podcast with topics dedicated to clinical research. CETERA annually promotes CETERA Award for Best Article in Cardiovascular Research.

With almost 10 years of activity, CETERA has succeeded in transforming itself into a medium-sized CRO whose mission remains focused on providing excellent research management services for industry, academia, and researchers, promoting quality clinical research.

www.aidfm-cetera.com

CETERA MANAGEMENT TEAM

Fausto J. Pinto Clinical and Scientific Director

Inês Zimbarra Cabrita Chief Operations Officer

Rita Carilho Torrão Scientific Affairs Manager



2021 & 2022 highlights

› **Promotion of several initiatives**

such as the Podcast “Sob a Lupa da Investigação Clínica”, Seminars, Training and Short courses. CETERA concluded in 2022 the 10th Edition of the course “Clinical Research: What’s it all about? ...a focused training for busy investigators and study teams”. This course aimed to provide robust skills concerning the operational aspects of conducting clinical research providing study teams with the tools to achieve a high performance concerning all steps of clinical research. This short course already had 9 editions and involved over 120 participants.

› CETERA has been involved in **12 clinical studies in 2021 and 2022**, including managing a European project.

› CETERA has been participating in several **international and national scientific research meetings.**

› CETERA promoted the **6th Edition of the CETERA Award for Best Article in Cardiovascular Research** with 20 candidates.



Access to iMM Facilities

Zebrafish Unit

The zebrafish facility at iMM carries out breeding, mating and provides husbandry in modern fully automated housing systems, to different wildtype strains, visually detectable transgenic reporter lines and mutants with loss- and gain-of-function phenotypes. Microinjection equipment and several fluorescent and bright field dissecting microscopes are available for use.

Bioimaging Unit

The Bioimaging Unit at iMM provides training and access to image acquisition and analysis using advanced microscopy equipment, such as Spinning Disk Confocal Microscopes, Point Scanning Confocal Microscopes, a Multi-photon Microscope, a Light Sheet Fluorescence Microscope, Widefield Fluorescence Microscopes, Fluorescence Stereo Microscopes and Brightfield Microscopes.

Rodent Unit

The Rodent Facility at iMM has a license of establishment for breeding and animal use, issued by the Portuguese competent authority (DGAV). The facility has a total capacity for 3212 mouse cages and 72 rat cages, housed in 3 different health status conditions: Production area, Experimental area and Quarantine area, where all animals are kept in individually ventilated cages systems. In addition to husbandry routines, staff supports specialized services such as colony management, rederivations of mouse lines, sperm and embryo cryopreservation, sample collections and surgical and experimental support to all research activities inside the animal facility.

Flow Cytometry Unit

The Flow Cytometry Unit at iMM is equipped with four cell analysers and two High Speed Cell Sorters. The cytometry unit provides scientific and technical support to all researchers on flow cytometry principles, experiment planning and sample preparation, as well as data analysis and interpretation.

Biobank Unit

The Biobank Unit at CAML includes biological samples (from surgery, biopsies, blood samples, ...) which are voluntarily donated with permission for preservation and future use in biomedical research. All samples are accompanied by clinical information, a crucial factor for subsequent research. This Biobank is approved by the CAML Ethics Committee and by the National Commission for Data Protection.

Comparative Pathology Unit

The Comparative Pathology Unit of iMM is complemented by the expertise of the Histopathology team of IGC, aiming to provide the best histology and comparative pathology support to all researchers, including processing and embedding samples, sectioning, quantitative pathology, and digital pathology.

Clinical Collaborative Departments

The Heart and Vessels Department

The Heart and Vessels Department of the Centro Hospitalar Universitário Lisboa Norte (CHULN, E.P.E.), established in 2015, encompasses the services of Cardiology, Vascular Surgery, and Cardiothoracic Surgery, to foster a more effective and innovative approach, based on coordination and cooperation. Most of CCUL's researchers are part of this department, conducting their clinical research within the CCUL framework.

The Radiotherapy Service

The Radiotherapy Service of the Centro Hospitalar Universitário Lisboa Norte (CHULN, E.P.E.) has a close collaboration with CCUL, particularly with the Angiogenesis research group to investigate the effects of low, moderate and high doses of ionizing radiation on vasculature as well as in cardiotoxicity. This research is of utmost relevance in the field of neovascularization, regenerative medicine and cardio-oncology.

CRECUL

The Cardiovascular Rehabilitation Center of the University of Lisbon (CRECUL), accredited by the European Association of Preventive Cardiology, resulted from the partnership involving the Lisbon School of Medicine, Universidade de Lisboa (ULisboa), the Faculty of Human Kinetics, ULisboa and the University Stadium of Lisbon. Its activity is recognized by the ULisboa as a community initiative, to promote health and secondary prevention, which, in turn, enhances the training of students in various specialties in the context of health. The close collaboration between CCUL and the CRECUL, including the exchange of researchers, has been instrumental in advancing research in the field of cardiovascular prevention and rehabilitation.



Inside Research Meetings

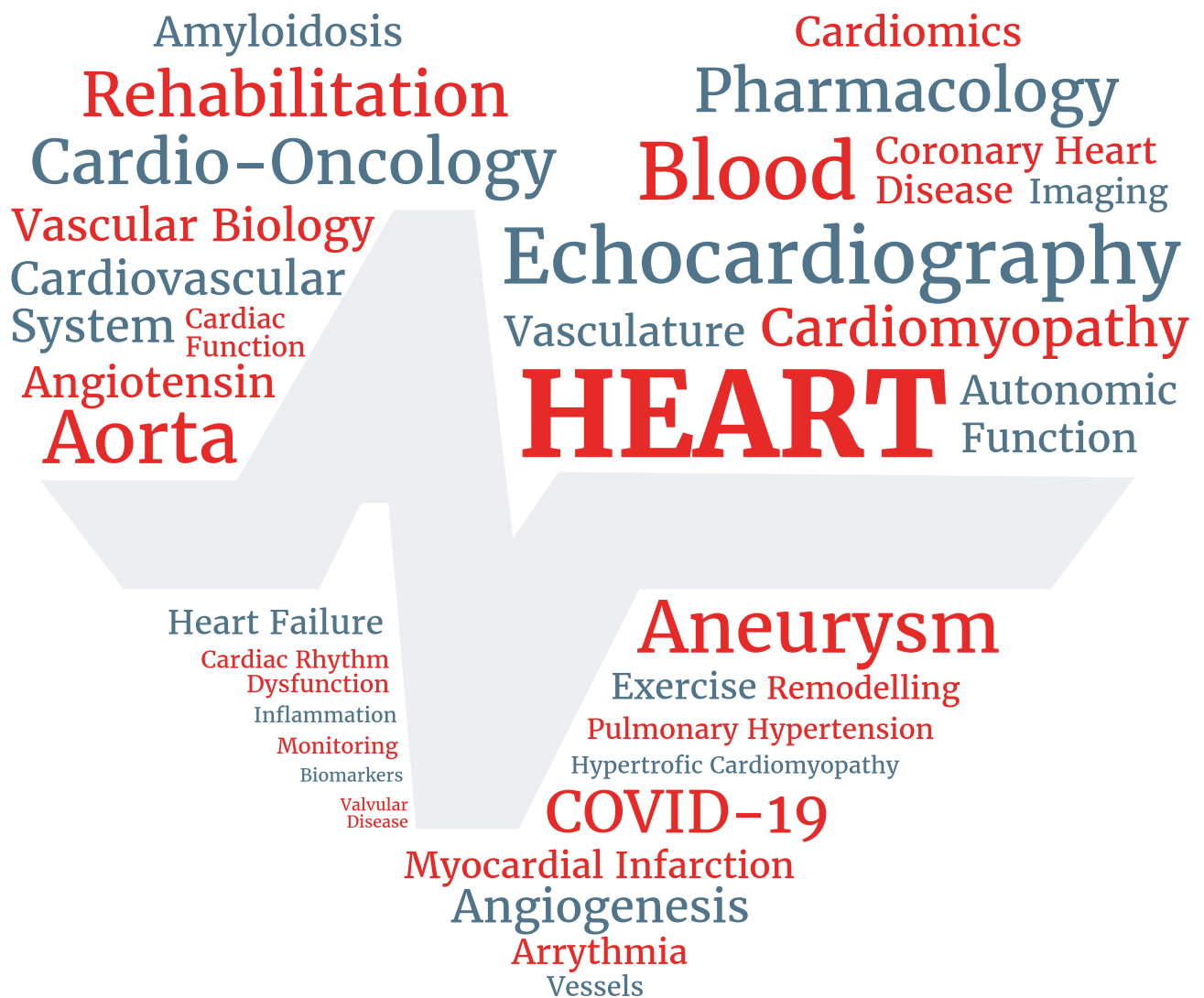
By bringing together researchers, clinicians, and stakeholders, these research meetings create a space for interdisciplinary exchange and advancement in cardiovascular science. These meetings help by disseminating knowledge, discussing recent discoveries, addressing challenges, and fostering collaborations. The inclusion of various formats like presentations, panel discussions, and workshops on advanced methodologies ensures that participants have diverse opportunities to spark innovative approaches to cardiovascular research and clinical practice.

18 **CARDIOVASCULAR LUNCH BREAKS**

Last thursday
of every month

Open to the CAML
Campus





International Congress

New Frontiers in Cardiovascular Medicine

The New Frontiers Congress in Cardiovascular Medicine is a mandatory event in the national medical scientific panorama, organized by AIDFM with the scientific supervision of the Department of Heart and Vessels of the Centro Hospitalar Universitário Lisboa Norte, (CHULN, E.P.E.) and the Cardiovascular Center of the University of Lisbon (CCUL). This Congress aims to promote discussion on new frontiers in the diagnosis and therapy of cardiovascular medicine, particularly in the context of Heart Failure and Pulmonary Arterial Hypertension, Cardiovascular Imaging, Intervention and Arrhythmology Cardiology, Coronary Disease, Valvular Diseases, Cardiomyopathy, Heart Surgery and Vascular Surgery. In the special context of COVID-19 pandemic, this annual gathering was adapted into a virtual model, in a unique setting of a digital congress.





2021 & 2022 highlights

2021

- › 17 international and 70 national speakers
- › 12 scientific topics
- › 720 participants
- › 5th AIDFM-CETERA award session for Best Article in Cardiovascular Research:

1st place — Elias, C et al. The ratio of furosemide dosage to urinary sodium concentration predicts mortality in patients with chronic stable heart failure. Doi: 10.20452/pamw.16083.

2nd place — Pereira-da-Silva, T. The Proinflammatory Soluble CD40 Ligand Is Associated with the Systemic Extent of Stable Atherosclerosis. Doi: 10.3390/medicina57010039.

3rd place — Laundos, TL et al. Consistent Long-Term Therapeutic Efficacy of Human Umbilical Cord Matrix-Derived Mesenchymal Stromal Cells After Myocardial Infarction Despite Individual Differences and Transient Engraftment. Doi: 10.3389/fcell.2021.62460.

2022

- › 18 international and 105 national speakers
- › 12 scientific topics
- › 733 participants
- › 6th AIDFM-CETERA award session for Best Article in Cardiovascular Research:

1st place — Mancio, J et al. Decoding the radiomic and proteomic phenotype of epicardial adipose tissue associated with adverse left atrial remodelling and post-operative atrial fibrillation in aortic stenosis. Doi: 10.1093/ehjci/jeac092.

2nd place — Lopes, PM et al. Assessing proportionate and disproportionate functional mitral regurgitation with individualized thresholds. Doi: 10.1093/ehjci/jeab023.

3rd place — Branco, MA et al. Human multilineage pro-epicardium/foregut organoids support the development of an epicardium/myocardium organoid. Doi: 10.1038/s41467-022-34730-7.

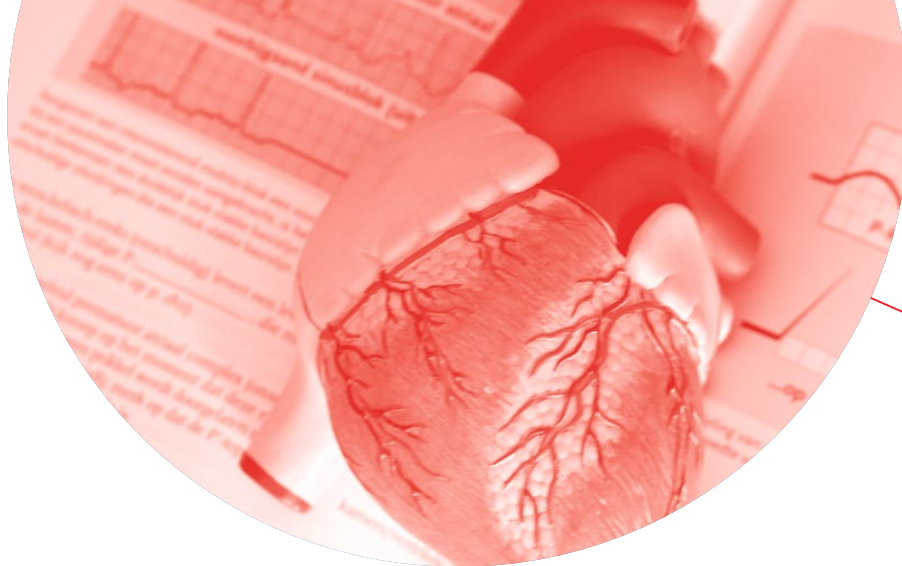
Graduate Education and Training

In graduate education and training, CCUL serves as a hub for knowledge dissemination, creation and application, with the ultimate aim of advancing academic excellence, addressing global challenges, and preparing the next generation of leaders and experts in the cardiovascular field. PhD researchers from CCUL:

- organize and teach in master's programmes and post-graduate courses;
- offer mentorship, guidance and support to graduate students in their doctoral studies.



Masters



Cardiovascular Rehabilitation

SCIENTIFIC COORDINATION

Ana Abreu CCUL, FMUL

Fausto J. Pinto CCUL, FMUL

Helena Santa Clara FMH

Catarina Sousa Guerreiro FMUL

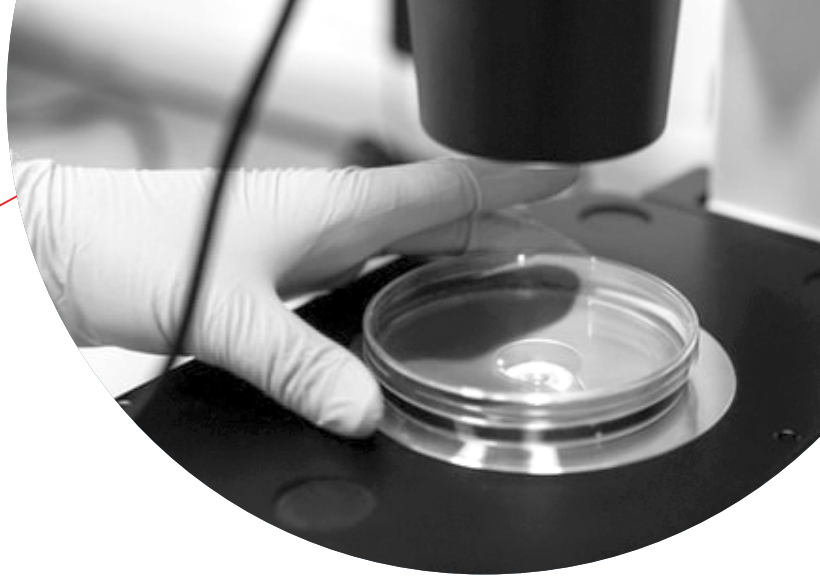
16 STUDENTS
/ YEAR

The Master in Cardiovascular Rehabilitation offers a curriculum with significant relevance to society, emphasizing recovery after acute cardiovascular events. The program aims to equip students with:

- › Comprehensive knowledge of the various components of cardiovascular rehabilitation programs, encompassing health sciences such as Medicine, as well as nutrition, psychology, exercise, communication sciences, and health education.
- › Opportunities to develop skills for conducting scientific research projects.
- › Competencies to actively participate in and implement multidisciplinary programs for prevention and cardiovascular rehabilitation across phases I, II, and III.

2021 & 2022 HIGHLIGHTS

- › **Expert International and National Speakers invited to lecture seminars** in the field of exercise training and testing, Tele-rehabilitation, risk factor management and nutrition.
- › **Scientific Posters presented by the Master degree students** at the European Association of Preventive Cardiology Congress and the Portuguese Society of Cardiology Congress.
- › **Participation of the Master degree students in the dissemination of Cardiac Rehabilitation** in hospitals and community.
- › **Clinical practice involvement of the Master degree students** in the several phases of the Cardiac Rehabilitation Program.



Biomedical Research

SCIENTIFIC COORDINATION

Luís Graça FMUL

Coordinators of the Cardiovascular Biology Curricular Unit

Fausto J. Pinto CCUL, FMUL

Susana Constantino CCUL, FMUL

10 STUDENTS
/ YEAR

The Master in Biomedical Research was built within the framework of the Lisbon Academic Medical Centre (CAML) consortium and takes advantage of this unique setting where knowledge and resources are shared between the three institutions that constitute CAML (FMUL/CHULN/iMM).

The objective is to prepare future researchers with a conceptual background on the principles underlying the application of the scientific method, with great involvement from the postdoctoral community.

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.

2021 & 2022 HIGHLIGHTS

- › **3 Lab rotations** / student / year
- › **Scholarships** for all selected students



Clinical Research

SCIENTIFIC COORDINATION

Fausto J. Pinto CCUL, FMUL

Joaquim Ferreira FMUL

20 STUDENTS
/ YEAR

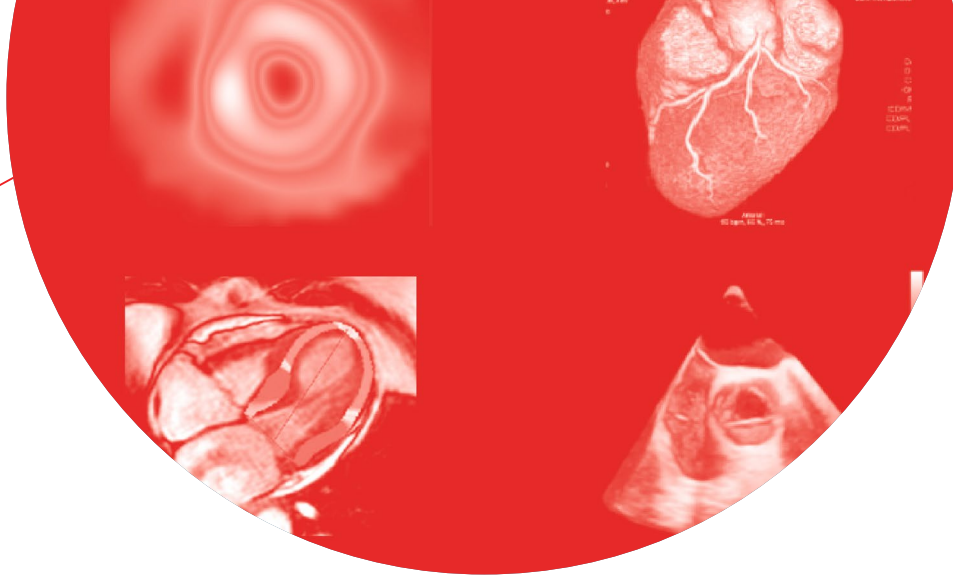
The Master in Clinical research held its first edition in 2021-2022, with an innovative program based on a multidisciplinary vision of Clinical Research. Its main objective is to develop and provide specialized scientific and professional skills in developing, conducting, and managing Clinical Research.

The focus of this programme is to provide students with:

- › Knowledge of the different methodologies and types of clinical studies within the development of medical drugs or medical devices.
- › Knowledge of the methods, procedures, ethical and regulatory standards necessary to plan, implement, coordinate and manage clinical studies, and to interpret and disseminate the results.
- › Skills to integrate research teams or multidisciplinary teams for Clinical Research management.
- › Tools to participate and/or lead research projects.

2021 & 2022 HIGHLIGHTS

- › **15 Seminars with National and International Speakers**, dedicated to themes such as patient empowerment, health economy and innovation in clinical research.
- › **“Sob a lupa da investigação Clínica”**, a podcast dedicated to clinical research, launched in 2022, and implemented by the Master degree students.



Cardiovascular Imaging

SCIENTIFIC COORDINATION

Ana G. Almeida FMUL

Fausto J. Pinto CCUL, FMUL

12 STUDENTS
/ YEAR

The Master in Cardiovascular Imaging held its first edition in 2021-2022, with a diversified study plan that offers a transversal vision of the different technologies associated to Cardiovascular Medicine. By providing in-depth knowledge of the Cardiovascular Imaging area, it aims to expand specialized scientific and professional skills, and the possibility of innovation through the elaboration of research projects of excellence.

This programme will allow students to:

- › Obtain specific training in non-invasive imaging modalities in Cardiovascular Medicine, with respect to the fundamentals and basic physical applications, image formation, acquisition methodologies and computational analysis, clinical information, indications, contraindications, limitations, risks and safety; Role of artificial intelligence.
- › Acquire general skills for integrated VCI in a comprehensive manner in the various aspects and in the perspective of multimodality, with understanding of the concepts of cost-effectiveness of VCI.
- › Develop tools for future innovation with implementation of clinical and basic research projects and development of new models of computational analysis and artificial intelligence with application in Human Health.

2021 & 2022 HIGHLIGHTS

- › **Pioneer Master** in the Iberian Peninsula and the second of its kind in Europe
- › **4 International Seminars**
- › **International students** from Angola, Equador and Brasil

Courses

Post-Graduate Course Update in Cardio-Oncology

SCIENTIFIC COORDINATION

Manuela Fiuza CCUL, FMUL

Fausto Pinto CCUL, FMUL

Cardio-oncology is a fast-growing field with increasing importance as newly developed cancer treatments improve cancer survival. The 4th and 5th editions, which took place in March 2021 and 2022, respectively, reviewed the state of the art in this subject, with more than 60 speakers from the fields of cardiology, oncology, hematology, and radio-oncology.

2021 HIGHLIGHTS

- › On-line format with **national and international broadcasts**
- › **28 Portuguese speakers and 5 international guests**
- › **Special conference** on “Non-coding RNAs in Cardio-Oncology: predictive potential for future cardiovascular events”
- › **Special participation** of Brasil

2022 HIGHLIGHTS

- › Hybrid format with **national and international broadcasts**
- › **36 Portuguese speakers and 6 international guests**
- › **Special conference** on “Intersections between Cardiac Metabolism and Cancer Biology – role of SGLT2 inhibitors”
- › **Special participation** from Angola and Mozambique

Clinical Research: What's it all about?

SCIENTIFIC COORDINATION

Inês Zimbarra Cabrita CCUL, CETERA

Francisca Patuleia Figueiras CCUL, CETERA

In 2022, CETERA concluded the 10th Edition of the course 'Clinical Research: What's It All About? ...a focused training for busy investigators and study teams' with 18 participants. This course was held online and aimed to provide robust skills concerning the operational aspects of conducting clinical research, equipping study teams with the tools to achieve high performance across all steps of clinical research.

The 9th Edition was held in 2021, also in an online format, with 21 participants. The short course 'Clinical Research: What's It All About?... a focused training for busy investigators and study teams' has had 10 editions and involved over 120 participants.

14 CCUL's PhD students

CCUL is affiliated with the Academic Medical Center of Lisbon (CAML) and most of the **14** PhD students integrate the Doctoral Programme of CAML.

The CAML PhD program is a flagship project designed to provide excellent doctoral training in the biomedical sciences. Students from different areas of the life sciences including medicine, biology, pharmacy and biochemistry, among others, are selected every year to participate in a training program comprising several courses, scientific lectures and workshops.



Telemonitoring Program

Researchers at CCUL developed and led the Heart Failure program carried out by the Cardiology Department of the Centro Hospitalar Universitário Lisboa Norte (CHULN, E.P.E.).

- Selected patients considered to be at greater risk of rehospitalization due to heart failure are remotely monitored at home for certain parameters, such as heart rate, weight, blood pressure, oxygen saturation in the blood, temperature, and ECG. This monitoring occurs daily for most biological signs, but weekly for the ECG. Patients are provided with the necessary equipment for this monitoring, as well as the necessary training.
- Parameter values are automatically transmitted to a Telemonitoring Centre, and when the parameters fall outside the preset values (each patient has their own limits), alerts are generated. These are evaluated by the team of health professionals at the center, according to criteria established by the cardiology team, and the patient is contacted by telephone.
- If these are true clinical alerts, the cardiology team is immediately contacted and connected to the patient to decide on the necessary intervention.



Telemonitoring
Program

Chronic
Heart
Failure

PUBLICATION

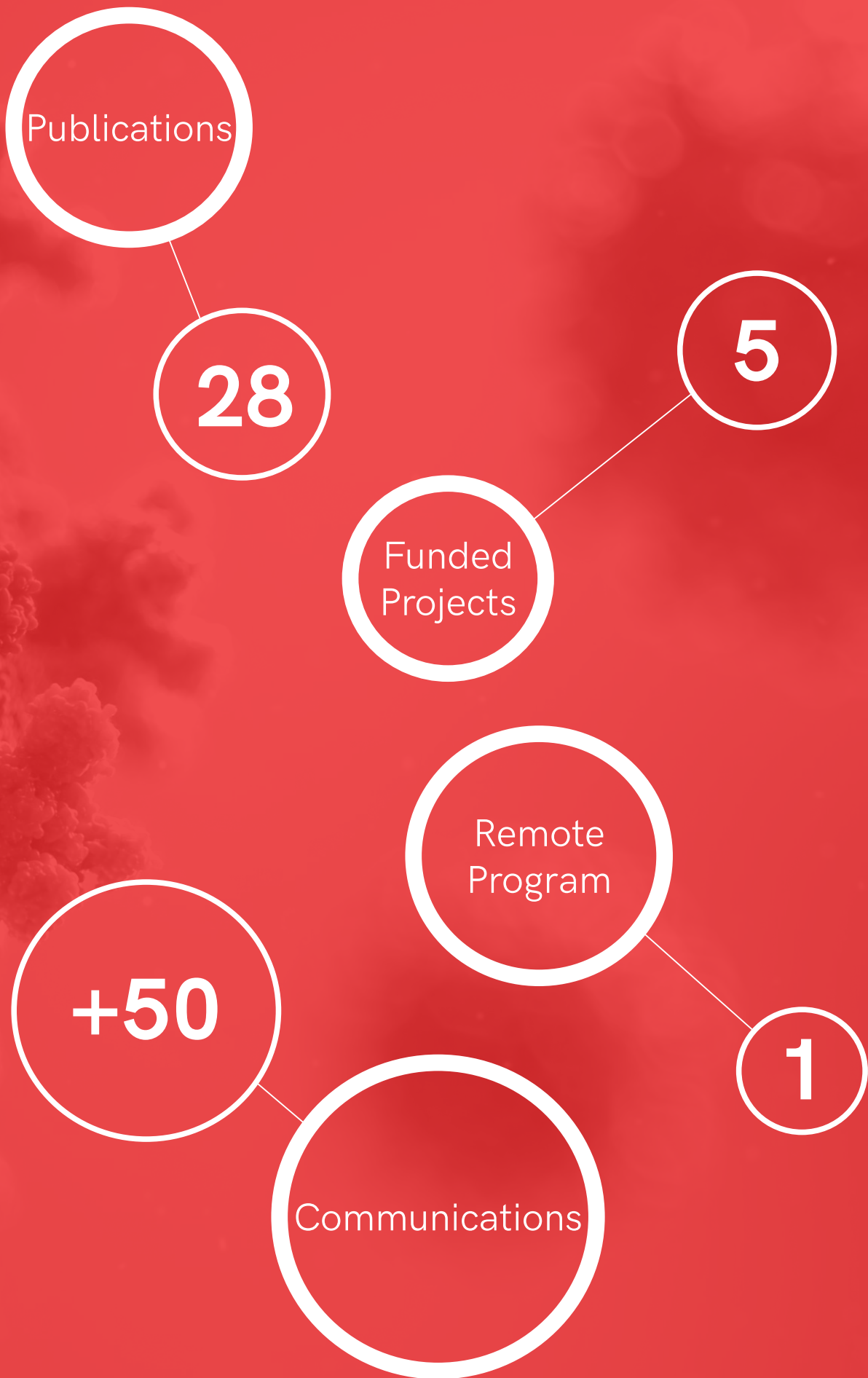
— Nunes-Ferreira A, Agostinho JR, Rigueira J, Aguiar-Ricardo I, Guimarães T, Santos R, Rodrigues T, Cunha N, António PS, Pereira SC, Morais P, Pedro MM, Veiga F, Pinto FJ, Brito D. Non-invasive telemonitoring improves outcomes in heart failure with reduced ejection fraction: a study in high-risk patients. ESC Heart Fail. Dec;7(6):3996-4004. doi: 10.1002/ehf2.12999.

CCUL & COVID-19

At 2020, the rapid spread of the virus that causes COVID-19 has sparked alarm worldwide. As part of its mission, CCUL actively participated in research, clinical practice, and accurate social media-based information. CCUL researchers have mobilized and work tirelessly to find ways to:

- Understand the effects of COVID-19 in the cardiovascular system;
- Develop innovative devices and surveillance platforms to monitor COVID-19 patients;
- Contribute to effective strategies to counteract the spread of coronavirus.

CCUL's researchers also developed a remote cardiovascular rehabilitation program.



Knowledge Transfer

Cardiovascular Disease (CVD) is the leading cause of death worldwide. Recognizing the critical role of health literacy in guiding individuals' health-related decisions, CCUL is dedicated to facilitating effective decision-making and contributing to the global reduction of CVD.

Through collaborative efforts with various stakeholders including the local community, schools, entrepreneurs, journalists, and science communication institutions, CCUL fosters dialogue across different cultures and generations. By engaging in initiatives such as educational programs, outreach activities, and media partnerships, CCUL serves as a valuable resource for promoting health awareness, lifelong learning, and training.



School Programmes

CETERA Kids

Project initiated in 2017 with the goal to explain, in a simple way, what is clinical research and how is the development process of pharmaceutical drugs, also focusing on understanding the importance of the appropriate use of the drugs. Sessions are held at schools for students of basic education.



For a Healthy Heart for all

Aiming to sensitize children and young people to adopt healthy lifestyles to prevent cardiovascular disease, CCUL promoted, on a voluntary basis, educative actions in schools for children from 3 to 18 years old.

TEACHER TRAINING

Teacher training courses, aimed at professionals in Basic and Secondary Education, are organized by CCUL in partnership with the Ciência Viva Training Center. They aim to support teachers in promoting cardiovascular literacy, facilitate contact between the educational community and the scientific community, and provide tools for debate and hands-on activities in the classroom context.

2021

02 Teachers Training Courses

| 15 Pre-school teachers

| 16 Primary school teachers

2022

02 Teachers Training Courses

| 22 Primary school teachers

| 32 Middle and high school teachers

CIENTIFICAMENTE PROVÁVEL

"Cientificamente provável" is a joint initiative of the Secretary of State for Education and the Secretary of State for Science, Technology and Higher Education, in which CCUL participates with the aim of promoting scientific literacy in cardiovascular health and facilitating contact between school community and the scientific community.

2021

03 Sessions

| 90 High school students

2022

08 Sessions

| 360 Middle school students

| 90 High school students

INTERACTIVE ACTIVITIES FOR SMALL CHILDREN

Development of face-to-face activities, especially dedicated to younger children, featuring storytelling, games, and drama to enhance understanding of concepts related to the cardiovascular system's function and promote the adoption of healthier habits and lifestyles.

2021

06 Sessions

| 144 Primary school students

2022

03 Sessions

| 25 Pre-school students

| 50 Primary school students

Educational Resources

For a Healthy Heart App Educação



A 16-page brochure and an interactive App to explore the Cardiovascular system, its main diseases and how to prevent them, using augmented reality.

Developed by CCUL, in partnership with LisbonLabs and COLA - Colectivo Audiovisual, and financed by Ciência Viva - National Agency for Scientific and Technological Culture, under the Call "Comunicar Saúde", this resource allows:

- › Teachers from Basic and Secondary Education to use augmented reality, and make contents more attractive and comprehensive;
- › Children and young people to use this material as a complement to their individual study and a way to share knowledge with their family;
- › Doctors to facilitate the communication with their patients.





#LabLife



A quiz-based interactive role-playing game designed to challenge young adults' knowledge of science in biology lab scenarios.

What happens to your heart beat when you exercise?



A guided hands-on activity designed for children to learn about the effects of exercise on their hearts.



Online Education Talks



Videos from expert speakers on cardiovascular health.

Online Quizzes



Q&A related to cardiovascular health and disease.

Public Events

European Researcher's Night

Every year on the last Friday of September, the European Researchers' Night brings researchers and science closer to society through a selection of activities that combine education and entertainment.

CCUL was present in the 2021 edition, in an event coordinated by the Universidade de Lisboa. Considering the special context of the COVID-19 pandemic, this annual participation was also adapted into a virtual model of interactive activities. CCUL offered three exploration-based learning activities:

- › **"What Happens to Your Heartbeat When You Exercise?"**: A guided hands-on activity for children.
- › **"Educação"**: Our augmented reality app for families to explore the cardiovascular system, its main diseases, and how to prevent them.
- › **"#LabLife"**: A quiz-based interactive role-playing game designed to challenge young adults' knowledge of science in biology lab scenarios.



World Heart Day

World Heart Day takes place on 29th September every year and serves as the world's biggest platform for raising awareness about cardiovascular diseases. In 2021, alongside an online campaign titled "How Best to Use Heart" and a cardiovascular health program of outdoor activities, CCUL organized a poster exhibition at the Santa Maria University Hospital. This exhibition aimed to encourage individuals to contemplate adopting healthier lifestyles and to promote heart health awareness.

In 2022, the Lisbon School of Medicine hosted a photo exhibition showcasing images captured during cardiovascular clinical and research technical procedures. Additionally, an educational workshop on cardiovascular risk was conducted, both online and in person. This workshop provided an opportunity for brainstorming, dissemination of tools, training, clarification, and prevention of cardiovascular diseases.





Science and Technology Week

The Science and Technology Week, coordinated by Ciência Viva, aims to showcase Portuguese scientists and their contributions to advancing knowledge, promoting scientific culture, and enhancing societal well-being. As part of the celebrations of the Science and Technology Week '21, CCUL organized an online Science Café. This event provided a platform to share and discuss current research in the cardiovascular field and its impact on society.

During the Science Café, CCUL researchers engaged with the public, sharing insights into their ongoing research projects and discussing the implications for scientific progress and societal well-being. By highlighting the latest advancements in cardiovascular research, CCUL aimed to foster a deeper understanding of the field and its importance in addressing health challenges.



May, the Heart Month

The Portuguese Cardiology Foundation has institutionalized the month of May as the “Heart Month” to raise citizens’ awareness of cardiovascular diseases. In collaboration with the Cardiovascular Rehabilitation Center of the University of Lisbon, CCUL celebrated May with a series of events aimed at all audiences, of all ages. These activities included online meetings, webinars, and outdoor events.

Simultaneously, “Active Breaks” were promoted across the entire campus, offering 15-minute sessions with stretching exercises led by the Exercise and Cardiovascular Rehabilitation Laboratory of CCUL. Another highlight of the month was the cycle of online conversations themed “Eyes that don’t see, a heart that doesn’t feel?”, resulting from the collaboration between CCUL and the Pavilion of Knowledge - Ciência Viva.



News from 2021 & 2022

More than 80 news from CCUL in news and press releases.

February 25th 2021

Portugal will have a large laboratory for clinical research and translation

DIÁRIO DE NOTÍCIAS

<https://www.dn.pt/sociedade/portugal-vai-ter-grande-laboratorio-de-investigacao-clinica-e-translacao--13391960.html>

February 25th 2021

Large clinical and translational research laboratory approved in Portugal

PÚBLICO

<https://www.publico.pt/2021/02/25/ciencia/noticia/aprovado-laboratorio-investigacao-clinica-translacao-portugal-1952090>

January 2nd 2021

Cardiologist Fausto Pinto assumes the presidency of the World Heart Federation

JUST NEWS

<https://justnews.pt/noticias/cardiologista-fausto-pinto-assume-a-presidencia-da-federacao-mundial-do-coracao>

November 30th 2022

“We need to look beyond heart failure”

DIÁRIO DE NOTÍCIAS

<https://www.dn.pt/sociedade/e-preciso-olhar-para-alem-da-insuficiencia-cardiaca-15401454.html>

September 16th 2022

Meet the experts: “The new era in the treatment of Heart Failure and Cardiovascular Medicine”

MYCARDIOLOGIA

<https://www.mycardiologia.pt/entrevistas/item/1688-meet-the-experts-“a-nova-era-no-tratamento-da-ic-e-da-medicina-cardiovascular”.html>

February 21st 2022

The impact of telemedicine on heart failure

MYCARDIOLOGIA

<https://www.mycardiologia.pt/entrevistas/item/1688-meet-the-experts-“a-nova-era-no-tratamento-da-ic-e-da-medicina-cardiovascular”.html>

June 6th 2021

CHULN: ceremony distinguishes European accreditation of the Cardiovascular Rehabilitation Center

JUST NEWS

<https://justnews.pt/noticias/chuln-cerimonia-distingue-acreditacao-europeia-do-centro-de-reabilitacao-cardiovascular/>

May 13th 2021

Genetics of the Portuguese population may explain vitamin D deficiency

RTP

https://www.rtp.pt/noticias/pais/genetica-da-populacao-portuguesa-pode-explicar-deficiencia-de-vitamina-d_n1319674

Peer-reviewed publications



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3. Aguiar-Ricardo, I., Agostinho, J., Pereira, A., Rodrigues, F., Brito, D., Pinto, F. J., Catarino, C., & Mendes Pedro, M. (2021). Acute coronary syndrome in a patient with severe hemophilia A: Difficult decisions. *Rev Port Cardiol (Engl Ed)*, 40(12), 985 e981-985 e985. <https://doi.org/10.1016/j.repce.2021.10.002>
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8. Alves, M., Abrantes, A. M., Portugal, G., Cruz, M. M., Reimão, S., Caldeira, D., Ferro, J. M., & Ferreira, J. J. (2021). Does Parkinson's Disease Increase the Risk of Atrial Fibrillation? Insights From Electrocardiogram and Risk Scores From a Case-Control Study. *Front Neurol*, 12, 633900. <https://doi.org/10.3389/fneur.2021.633900>
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