



INSTITUTO DE HIGIENE E  
MEDICINA TROPICAL  
DESDE 1902



# GHTM | ACTIVITY PLAN 2022/23



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## GHTM | ACTIVITY PLAN 2022/23

### 1 - General STRATEGIC FRAMEWORK objectives:

- **Promote and develop RESEARCH** in the areas of excellence at the center, in the context of the objectives of the research groups (Research Groups -RG) and the priority research lines (Cross-cutting Issues - CCI) of the GHTM / IHMT / NOVA (Figure 1), in line with NOVA's global scientific strategy (emphasizing NOVA Health platform) and IHMT/NOVA;

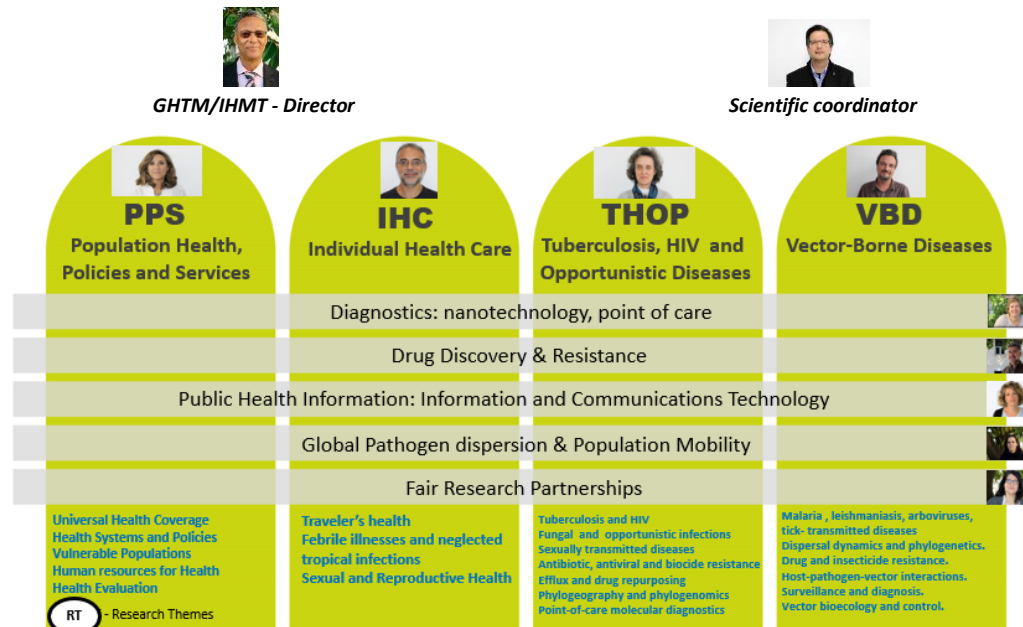


Figure 1 - GHTM / IHMT / NOVA scientific council and organizational framework



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- **Implement in 2022/23 the strategy** defined and approved for the GHTM / IHMT / NOVA for 2019-2023 incorporating the improvement proposals of the FCT Evaluation Panel (2019) and the GHTM Scientific Advisory Board (see Annex I), ensuring success of the execution and financing plan approved by FCT for 2019-2023;
- Promote the **Open Science policy** at GHTM / IHMT / NOVA through the maintenance and constant updating of its activities in the bibliometric repository PURE-NOVA [<https://novaresearch.unl.pt/en/organisations/global-health-and-tropical-medicine-ghmt>], support for attracting new projects and managing ongoing projects;
- Implement the **integrated management GHTM / IHMT / NOVA** with the new strategic infrastructures - **security insectary ACL-3 VIASEF** - and the **Biological Resources Center / biobank - Biotropical Resources (BIOTROP)** [<https://www.ihmt.unl.pt/investigacao/biobanco/>];
- Complete the implementation of the general sample management regulation and standard procedures to regulate the data management of the research carried out at IHMT / NOVA;
- Promote the implementation of a **new Associated Laboratory of the Science and Technology Foundation [Associated Laboratory in Translation and Innovation Global Health Towards]**, in consortium with NOVA Medical School's Comprehensive Health Research Center (CHRC) [[http://www.nms.unl.pt/main/index.php?option=com\\_content&view=article&id=2376:comprehensive-health-research-centre-chrc&catid=2:uncategorised&Itemid=500&lang=pt](http://www.nms.unl.pt/main/index.php?option=com_content&view=article&id=2376:comprehensive-health-research-centre-chrc&catid=2:uncategorised&Itemid=500&lang=pt)], the National School of Public Health [<https://www.ensp.unl.pt/>], FCT / NOVA's LIBPhys [<https://www.libphys.fct.unl.pt/>] and the University of Évora [<https://www.uevora.pt/>];
- Framing the research actions of the GHTM / IHMT / NOVA in the Sustainable Development Goals (SDGs) and in the guidelines of the;
- Direct and adapt the Central Research Themes of the GHTM / IHMT / NOVA (Figure 1) to the objectives and actions of the European Union and National Horizon Europe Strategies [[https://ec.europa.eu/info/horizon-europe\\_en](https://ec.europa.eu/info/horizon-europe_en)] and Portugal 2030 [<https://www.portugal.gov.pt/pt/gc21/governo/programa/portugal-2030.aspx>] framework and align these themes with the priorities of the Portugal 2030 Strategy and the University NOVA, promoting the sharing of NOVA Saúde initiatives at IHMT / NOVA;
- Align the objectives for Research at the GHTM / IHMT / NOVA with the objectives for the teaching and training of post-graduate human resources at IHMT / NOVA, reinforcing the inclusion and participation of doctoral students (3rd Cycle) of IHMT / NOVA in GHTM / IHMT / NOVA.



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## 2 - Specific STRATEGIC FRAMEWORK objectives:

**Objective #1** – Promote RG X CCIs joint Projects and activities along the Strategic framework for 2019-2023 of GHTM/IHMT/NOVA.

**Objective #2** – Implementation of a new Associated Laboratory of the Science and Technology Foundation [Associated Laboratory in Translation and Innovation Global Health Towards] and RH management.

**Objective #3** – Integrated management GHTM / IHMT / NOVA with the new strategic infrastructures - security insectary ACL-3 VIASEF - and the Biological Resources Center / biobank - Biotropical Resources (BIOTROP);

**Objective #4** – Align GHTM / IHMT / NOVA with NOVA Saúde Cluster, NOVA for the Globe initiative, WHO Collaborating Center, Ciência LP and already established networks (IANPHI, ASPHER, TROPED etc) activities with focus on the European Union and National Horizon Europe Strategies and Portugal 2030 Strategy; Alignment of activities with the Sustainable Development Goals (SDGs)

**Objective #5**– Promote Open Access Policy, improve quality of GHTM/IHMT/NOVA publications and improve management of GHTM/IHMT/NOVA at NOVA PURE Research Portal

**Objective #6** – Implement an integrated management plan for equipment inventory, sharing and replacement/renovation to support research.



## RG – IHC

The main lines of action of the IHC group are related to the transversal areas of the GHTM, Global Dispersion of Pathogenic Organisms and Population Mobility, Discovery and resistance to drugs and Diagnosis and Clinical Trials. The main research themes are: (a) Traveler's Health, (b) Neglected Tropical Infections, and (c) Sexual and Reproductive Health. The activities planned for 2022/23 fall within the transversal themes described above:

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<p><b>Research activities ongoing in 2022/2023 with CCI:</b></p> <p><b>CCI - Diagnostics (DG)</b></p> <p><b>CCI - Drug Discovery &amp; Resistance (DDR):</b></p> <p><u>Research Project:</u> Towards an arsenic-free oral treatment for human African trypanosomiasis due to <i>Tb rhodesiense</i> as a tool for disease elimination. UE/ EDCTP GA nº RIA2017NCT-1846 (2018-2021). IHC researcher: Jorge Seixas.</p> <p><u>Research Project:</u> Towards a pediatric indication for children between 1 and 14 years of age for a safe, effective, all-oral single-dose treatment formulation of acoziborole for first and second stage gambiense human African trypanosomiasis (g-HAT). UE/EDCTP RIA2019PD-2890 (2020-2024). IHC researcher: Jorge Seixas.</p> <p><u>Research Project:</u> Observational cross-sectional study on visceral leishmaniasis (VL), caused by <i>L. infantum</i>. Doctoral Thesis of Rafael Amorim Rocha. Supervisors: Carla Maia (VBD), Cláudia Conceição (IHC), and Luzia Gonçalves PPS).</p> <p><u>Research Project:</u> Monitoring antimalarial drug response in imported malaria cases in Portugal. PI: Fátima Nogueira (VBD). IHC collaborator: Cláudia Conceição. Partially funded by GHTM.</p> <p><u>Research project:</u> Morbidity associated with infection with <i>Schistosoma</i> and intestinal parasites in adults from Mozambique. PhD Thesis, João Tiago Serra. Supervisor: Cláudia Conceição. Co-supervisors: Silvana Belo e Mohsin Sidat.</p> <p><u>Research project:</u> Prevalence of asymptomatic leishmaniasis in Portugal. PhD thesis, Rafael Amorim Rocha. Supervisor: Carla Maia (VBD). Co-supervisors: Cláudia Conceição (IHC) and Luzia Gonçalves (PPS).</p>	<p>Patient enrollment was completed in October 2021. Last patient-last follow up visit should be completed in October 2022. Paper describing main results expected for late 2023.</p> <p>Due to unexpected difficulties in the development of the pediatric formulation, the clinical trial could only be started in January 2022.</p> <p>Ongoing.</p> <p>Ongoing. Two open-access papers published so far.</p> <p>Field work completed. Thesis to be defended.</p> <p>Ongoing</p>	



<p><u>Research project:</u> Studying the activity of repurposed drugs against Neisseria gonorrhoeae: targeting membrane transport and energy metabolism</p>	<p>Ongoing with own funds and submitted for FCT funding Call2022</p>	
<p><u>Research project:</u> Vertical transmission of Hepatitis B in Angola: Evidence for political decision making</p>	<p>Submitted and approved for funding in 2021. Starting date: March 2022.</p>	
<p><b>CCI - Public Health Information (PHI):</b></p>		
<p>COVID-19 vaccination in migrants from Lisbon area. IHC researcher: Philip J. Havik. Funding: Centro Padre Álvares Correia, Lisboa.</p>	<p>MSc Thesis of Licinia Marla Aragão, co-supervised by Rosa Teodósio and Philip J. Havik. Ongoing.</p>	
<p>Covid 19: knowledge attitudes and practices of Angolan migrants in Portugal. IHC researchers: Rosa Teodósio (MSc thesis supervisor) and Philip J. Havik</p>	<p>MSc Thesis of Ilda Cesa, co-supervised by Rosa Teodósio. Ongoing.</p>	
<p><u>Research project:</u> "Estudo de conhecimentos, atitudes e literacia em vacinação contra a febre amarela e contra a hepatite A de viajantes e migrantes portugueses"      Team: Ilda Cesa (MSc student), Maria Raquel Pacheco, Ricardo Pereira Igreja (UFRJ), Rosa Teodósio (IHC)</p>		
<p><b>CCI - Global Pathogen dispersion and Population Mobility (GPPM):</b></p>		
<p><u>Research Project:</u> Malaria control and elimination: addressing the occult parasite reservoir. PI: Marcelo U. Ferreira (IHC). Funding: FCT (UID/04413/2020).</p>	<p>Starting date: 01/2022</p>	
<p><u>Research project:</u> "Imigrantes Guineenses em Portugal: noção de riscos e de cuidados necessários em viagens ao país de origem". Team: Jaime Tchuda (PhD student), Rosa Teodósio (IHC).</p>	<p>MSc thesis of Jaime Tchuda. Supervisor: Rosa Teodósio. Ongoing.</p>	
<p><u>Research project:</u> "Parasitas intestinais em comunidades migrantes do município do Seixal". Team: Tanya Jasse (MSc student), Rosa Teodósio (IHC), Manuela Calado (VBD).</p>	<p>MSc thesis of Tanya Jasse. Supervisor: Rosa Teodósio. Ongoing.</p>	
<p><u>Research project:</u> "Strongyloides stercoralis: prevalência e transmissão em comunidades vulneráveis"      Team: Damarize Carinton (MSc student), Rosa Teodósio (IHC), Isabel Maurício (VBD).</p>	<p>MSc thesis of Damarize Carinton. Supervisor: Rosa Teodósio. Ongoing.</p>	
<p><u>Research project:</u> Analysis of causes and risk factors contributing to Perinatal and Neonatal Morbidity and Mortality in S. Tomé e Príncipe – a case-control study. Filomena Pereira (IHC);</p>		



<p>•  <u>Research project:</u> Syphilis, infection by HIV and by HBV in Benguela, Angola: characterization and infection. Filomena Pereira (IHC); Dinamene (IHC)</p> <p><b>CCI - Fair Research Partnerships (FRP)</b></p>		
<p><b>New Research Projects planned for 2022/2023 with CCIs:</b></p> <p><b>CCI: Diagnostics (DG):</b></p> <p><u>Research Project:</u> Electrochemical biosensor for the rapid detection of SNPs associated with drug-resistant malaria. PI: Ana Tavares (VBD). IHC collaborator: Marcelo U. Ferreira. Submitted to FCT, 2022.07756.PTDC.</p> <p><u>Research Project:</u> Differential diagnosis of acute febrile illnesses in the Tropics: a multicenter study. co-PIs: Jorge Seixas and Marcelo U. Ferreira (IHC). To be submitted for external funding in Brazil and Europe</p> <p><u>Research Project:</u> Pyruvate kinase deficiency and protection against malaria: exploring the underlying mechanisms and the impact on populations. PI: Ana Paula Arez (VBD). IHC collaborator: Marcelo U. Ferreira. Submitted to FCT, 2022.02178.PTDC.</p> <p><u>Research Projects on STI</u>, specially in their effects in sexual reproductive health will still take place: 1) Group B streptococci in pregnant women and their neonates in Maputo: is it a problem and at what extent? 2) Detect ion of azithromycin resistance in <i>Mycoplasma genitalium</i> (with THOP).</p> <p><b>CCI: Drug Discovery &amp; Resistance (DDR):</b></p> <p>Research Project: Identification and prioritisation of <i>Plasmodium vivax</i> vaccine antigens. PI: Julian Rayner (University of Cambridge, UK). IHC collaborator: Marcelo U. Ferreira. Funded by a research agreement between NOVA University of Lisbon and University of Cambridge.</p> <p><b>CCI: Global Pathogen dispersion and Population Mobility (GPPM).</b></p> <p>Research Project: Population genomics of malaria introduction in the Americas. PI: Marcelo U. Ferreira. To be submitted to La Caixa Foundation.</p>	<p>Starting date (if funded): 10/2022</p> <p>Starting date (if funded): 06/2023</p> <p>Starting date (if funded): 10/2022</p> <p>Starting date (if funded): Fall 2022</p> <p>Starting date: 04/2022.</p> <p>Starting date (if funded): 09/2023</p>	



<p><u>Research Project:</u> Mapping Plasmodium falciparum transmission networks in Guinea-Bissau: a molecular epidemiology approach. PI: Márcia M. Medeiros (VBD). Collaborators: Marcelo U. Ferreira (IHC), Ana Paula Arez (VBD). Submitted to GHTM/IHMT-NOVA Call for Proposals 2022</p> <p><b>CCI - Fair Research Partnerships (FRP):</b></p> <p>Iniciativa para o reforço dos serviços sanitários de primeiro e segundo nível em Angola. Promoter: Centro per le Malattie Tropicali Ospedale Sacro-Cuore Don Calabria, Verona, Italy, IHMT partner.</p>	<p>Starting date (if funded): 05/2022</p> <p>Ongoing</p>	
<p><b>Congresses//Events:</b></p> <p>India EMBO Lecture Course: Malaria molecular epidemiology, population genetics, and evolution: Principles to practices. To be held in New Delhi, India, in November 2022. IHC member involved: Marcelo U. Ferreira (invited speaker).</p> <p>Workshop-Webinar addressing 'the sociocultural dimensions and community perspectives on HAT Elimination'</p> <p>A meeting on Health communication will take place by the end of 2022</p>	<p>To be held in November 2022</p> <p>To be held at IHMT in May 2022.</p> <p>Fall 2022</p>	
<p><b>Publications/Training:</b></p> <p>At least 8 papers in international journals related with the results and outcomes of the ongoing clinical trials and projects indexed in Scopus.</p>	<p>Minimum of 8 Papers published in scopus; increasing the number of Q1 publications</p> <p>At least six MSc thesis and three PhD Thesis forecasted</p>	
<p><b>Capacity building:</b></p> <p>Criação de uma Rede de Medicina Tropical e Medicina do Viajante em Português. Promoter IHMT.</p>		
<p><b>Other activities:</b></p>		





**RG – PPS**

The main research topics of the PPS group are: Health Policy and Planning; Human Resources for Health; Health determinants of vulnerable populations. The activities planned for 2022/23 fall into the various cross-cutting areas described above:

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<p><b>Research activities ongoing in 2022/2023 with CCIs:</b></p> <p><b>CCI - Diagnostics (DG)</b>  <b>CCI - Drug Discovery &amp; Resistance (DDR)</b></p> <p><b>CCI – Public Health Information (PHI):</b></p> <p>2 ongoing projects funded by Bloomberg Philanthropies Data for Health Initiative: Putting into practice activities related to a Population based Cancer Register for Cape-Verde; and a Population-based Cancer Register for Lubango, Angola</p> <p>2 ongoing projects funded by European Funds: VAX-TRUST - Addressing vaccine hesitancy in Europe and BCG vaccine to reduce unplanned absenteeism due to illness of health care workers during the COVID-19 pandemic. A multi-center randomized controlled trial.</p> <p>EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics</p> <p><b>CCI - Global Pathogen dispersion and Population Mobility (GPPM) :</b>        Implementation of 2 cohort studies for native and migrant children in 5 Municipalities of Lisbon Region:        2<sup>nd</sup> wave of data for Amadora Municipality        1<sup>st</sup> wave of data for Barreiro, Moita, Montijo and Alcochete Municipalities</p> <p>Implementing a study on the impact of covid19 on migrant’s health in Amadora Municipality, funded by FAMI</p> <p>EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics</p> <p><b>CCI - Fair Research Partnerships (FRP):</b></p>	<p>Implementation of the 1<sup>st</sup> Population based Cancer Register for Cape-Verde and for Lubango, Angola.</p> <p>Databases on children’s health profile; databases on health care access by natives and migrant children; evidence on refugee’s access to healthcare during covid-19 in Lisbon region;        Databases on covid19 mortality and mobility by immigrants status; database on covid19 incidence by immigrant status;</p>	



<p><b>New Research Projects planned for 2022/2023 with CCIs:</b></p> <p><b>CCI - Public Health Information (PHI):</b></p> <ul style="list-style-type: none"> <li>• Risk of mortality and morbidity after vaccination against SARS-CoV-2 in Continental Portugal: total population, special exposure retrospective cohort study</li> <li>• Collaboration in the conception of a Health Research Centre in Maputo, Mozambique (ISCTEM University, Matola Regional Hospital and Matola health units)</li> </ul> <p><b>CCI - Global Pathogen dispersion and Population Mobility (GPPM):</b></p> <ul style="list-style-type: none"> <li>• Implementation of a children cohort study in Santiago Island, Cape Verde</li> </ul> <p><b>CCI - Fair Research Partnerships (FRP):</b></p> <ul style="list-style-type: none"> <li>• Gender equality in immigration integration policies: pathways for immigrant women empowerment (planned to be submitted Horizon)</li> <li>• HEROES - HEalth woRkforce to meet healt challengeS (submitted Call: EU4H-2021-JA2-IBA - Joint actions wave 2)</li> </ul>		
<p><b>Congresses//Events:</b></p> <p>Scientific Writing Workshop</p> <p>Luso-Brazilian Meeting in Health Assessment and Knowledge Management</p> <p>European Congress in Public Health 2022</p> <p>Other seminars</p>	<p>Hybrid Scientific Writing Workshop by Joana Pais Zózimo, PhD   Lancaster University, 21 march 2022.</p> <p>Talk show: Mesa redonda virtual em química medicinal: Farmanguinhos, IHMT e UA.        Online: Dia/Hora: 11 de março de 2022, às 11 horas Brasil e 14 horas Portugal.</p>	<p>20 participants</p>
<p><b>Publications/Training:</b></p> <p>Publication of 40 Scientific Papers</p> <p>Publication of 2 books</p>	<p>Minimum of 40 Papers published in scopus; increasing the number of Q1 publications</p> <p>2 books published</p>	



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<p>Training:          Master in Field Epidemiology Training for Portuguese-speaking West African Countries EDCTP, CSA Capacity development for disease outbreak and epidemic response in sub-Saharan Africa, in collaboration with Africa CDC (CSA 2020 E 3113)</p>	<p>More than 20 MSc Students completing the master degree at different MSc courses where PPS is involved. At least 3 PhD degrees completed.</p>	
<p><b>Capacity building:</b>          eLearning Course on Ethics for Health research for Lusophone African scientists</p> <p>Advanced Course on Health Statistics for Mozambican National Institute of Health Researchers</p> <p>Short training sessions on Fair Research Partnership</p> <p>Master in Field Epidemiology Training for Portuguese-speaking West African Countries EDCTP, CSA Capacity development for disease outbreak and epidemic response in sub-Saharan Africa, in collaboration with Africa CDC (CSA 2020 E 3113)          Others:</p>	<p>Seminars given in the e-learning Course on Ethics for Health Research (14-18 march 2022)          Number of National Ethics Presidents as speakers: all from the 5 Portuguese African Speaking Countries          N° of students attending all the course (51/56)</p> <p>Advanced Course on Health Statistics (8-14 May 2022), INS-MISAU Maputo, Mozambique</p> <p>Curso: Novas Abordagens para Gestão de Projetos e Propriedade Industrial em Saúde.          Local: IHMT presencial e on-line. Dias 17 e 18 de maio de 2022</p>	<p>420 candidates          56 selected participants from Angola, Cape-Verde, Guine-Bissau, Mozambique and S. Tomé e Príncipe</p> <p>51 Certificates</p> <p>12 invited speakers</p>
<p><b>Other activities:</b></p>		



## RG – THOP

The overarching aim of the THOP group is the molecular epidemiology, diagnosis, study of drug-resistance mechanisms, drug discovery and control of tuberculosis (TB), HIV and opportunistic diseases on a Global Health perspective in an era of antimicrobial resistance, chronic immunosuppressive diseases and now the COVID pandemic. Still recovering from the many challenges brought by the pandemic, we envisage the following aims for the THOP Group for 2022-2023. The main research topics of the THOP group are: Tuberculosis and HIV; Fungal and opportunistic infections; Sexually transmitted diseases; Antibiotic, antiviral and biocide resistance; Efflux and drug repurposing; Phylogeography and phylogenomics; Point-of-care molecular diagnostics. The activities planned for 2022/23 fall into the various cross-cutting areas described above:

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<b>Research activities ongoing in 2022/2023 with CCIs:</b>		
<b>CCI - Drug Discovery &amp; Resistance (DDR)</b>		
<ul style="list-style-type: none"> <li>• Project TMC207 Calib financed by Becton&amp;Dickinson (2021/23)</li> <li>• Project Breakpoint Calibration for DLM, BDQ, LZD, MOX against <i>M. tuberculosis</i> financed by EUCAST, Becton&amp;Dickinson and ThermoFisher (2021/23)</li> <li>• Projects FCT-MTB-EPIs and FCT-TARGETUB (ongoing 2022/23) - New INH derivatives and new EPIs against <i>M. tuberculosis</i> - financed by FCT/MCTES</li> <li>• Aetiology and epidemiology of <i>Acinetobacter baumannii</i> through genomics to track global antimicrobial resistance – UI/BD/151063/2021 (ongoing 22/23)</li> <li>• Gilead TB&amp;HIV nanodiagnostics (ongoing 22/23)</li> <li>• Inhibition of efflux in <i>M. tuberculosis</i> persister cells during dormancy – CEECIND/02562/2017 (ongoing 22/23)</li> </ul>	<p>2 articles Q1 within CCI DDR – 22/23            1 PhD thesis completed in 2023            1 MSc Thesis completed in 2022            1 national/international project submitted</p>	
<ul style="list-style-type: none"> <li>• Drug repurposing for <i>N. gonorrhoeae</i></li> <li>• Molecular detection of antibiotic resistance in <i>Mycoplasma genitalium</i> (w/ IHC)</li> </ul>	<p>1 review; 2 original articles            At least 2 new MSc students and 1 PhD student</p>	
<ul style="list-style-type: none"> <li>• Project BIOSAFE (ongoing) - financed by FEDER/FCT</li> </ul>	<p>2 articles Q1 within CCI DDR – 22/23            2 MSc Thesis completed in 2022            2 MSc Thesis completed in 2023            1 national/international project submitted</p>	
<ul style="list-style-type: none"> <li>• Antimicrobial resistance in <i>S. aureus</i> causing bloodstream infections in children in Mozambique</li> </ul>	<p>2 original articles in 2022            1 PhD completed by 2023</p>	
<ul style="list-style-type: none"> <li>• Endoperoxides against Leishmania parasites: in vitro activity and mode of action (with VBD – Sofia Cortes)</li> </ul>	<p>1 original article</p>	
<ul style="list-style-type: none"> <li>• Molecular epidemiology of HBV in Angola: drug resistance and immune escape mutants</li> </ul>	<p>1 MSc Thesis completed in 2022</p>	



<b>CCI - Diagnostics (DG)</b>		
<ul style="list-style-type: none"> <li>Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK)</li> </ul>	<i>1 article Q1 within CCI D – 22/23</i> <i>1 Training period in Universitat Rovira i Virgili</i>	
<ul style="list-style-type: none"> <li>Diagnosis of sexually transmitted diseases (w/ IHC)</li> </ul>		
<ul style="list-style-type: none"> <li>Determination of the transcriptomic alterations in HDV-induced hepatocellular carcinoma (FCT) ongoing</li> </ul>	<i>1 article Q1</i>	
<ul style="list-style-type: none"> <li>Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis (ongoing); (with VBD)</li> </ul>	<i>MSc dissertation + Oral /poster presentation Congress + article</i>	
<ul style="list-style-type: none"> <li>Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitaniae</i> (ongoing). (with VBD)</li> </ul>	<i>Oral/ poster presentation Congress + article</i>	
<b>CCI - Public Health Information (PHI)</b>		
<ul style="list-style-type: none"> <li>BCG vaccine to reduce unplanned absenteeism due to illness of health care workers during the COVID-19 pandemic. A multi-center randomized controlled trial.</li> </ul>		
<b>CCI - Global Pathogen dispersion and Population Mobility (GPPM)</b>		
<ul style="list-style-type: none"> <li>Project REDETB – Early diagnostics, phylogeography, dispersion and epidemiology of M/XDR-TB in Brasil as part of the CPLP-TB consortium and platform</li> </ul>	<i>1 article Q1 within CCI GPPM – 22/23</i> <i>1 international project submitted</i>	
<ul style="list-style-type: none"> <li>Genome diversity of rotavirus in Mozambique</li> </ul>	<i>1-2 papers in Q1</i>	
<b>CCI - Fair Research Partnerships (FRP)</b>		
<b>New Research Projects planned for 2022/2023 with CCIs:</b> <ul style="list-style-type: none"> <li>Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK) (WITH CCI DG)</li> <li>Inhibition of efflux in <i>M. tuberculosis</i> persister cells during dormancy – CEECIND/02562/2017 (ongoing 22/23) (WITH CCI DDR)</li> <li>New drugs for <i>N. gonorrhoeae</i>: targeting membrane transport and energy metabolism to fight antimicrobial resistance (FCT). Submitted. (WITH CCI DDR)</li> <li>Study of antimicrobial resistance and genotypes of <i>M. genitalium</i> (DDR) (planned to be submitted at FCT 2023) (WITH CCI DDR)</li> <li>Exploring efflux inhibition to counteract antimicrobial resistance and biofilms in staphylococci (FCT). Submitted. (WITH CCI DDR)</li> <li>Splicing alterations in SARS-Cov-2 infection (DG) (planned to be submitted at FCT 2023) (WITH CCI D)</li> <li>Exploring Lyme Borreliosis miRNAs signature w/ THOP – FCT submitted (WITH CCI DG)</li> </ul>	<i>At least 8 national/international projects submitted, 1 approved.</i>	



<ul style="list-style-type: none"> <li>• Tiny molecules with big impacts: exploiting microRNA immune targets in dog trypanosomatid infection (w/ VBD, PI G. Santos-Gomes) – FCT (WITH CCI DG)</li> </ul>		
<p><b>Congresses/Events:</b></p> <ul style="list-style-type: none"> <li>• European Congress of Clinical Microbiology &amp; Infectious Diseases (2022 and 2023)</li> <li>• European Society of Mycobacteriology Meeting, ESM (2022 and 2023)</li> <li>• MICROBIOTEC 2023</li> <li>• ISSSI (Int. Symp Staphylococci &amp; Staph infections), 2022</li> <li>• ILS (International leptospirosis Society Meeting (Bangkok, Thailand (Nov 2022); or 16th Conference on Lyme Borreliosis and Other Tick-borne Diseases, 4 -7 Sept 2022, Amsterdam, Netherland</li> <li>• 2º Simpósio Internacional de Genética (Luanda, Angola, June 2022)</li> </ul>	<p><i>At least 15 posters and 5 oral communications</i></p>	
<p><b>Training:</b></p> <ul style="list-style-type: none"> <li>• Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK)</li> <li>• Microscopy course in York, 2023 (to be confirmed)</li> <li>• Increase the number of doctoral students enrolled in GHTM-THOP group</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Initiative accomplished by the end of 2023</i></li> <li>• <i>Initiative accomplished by the end of 2023</i></li> <li>• <i>At least 3 new PhD students enrolled in GHTM-THOP group by the end of 2023.</i></li> </ul>	
<p><b>Capacity building:</b></p> <ul style="list-style-type: none"> <li>• New GHTM BIOMOL MINION laboratory for Molecular detection and sequencing of pathogens (with CCIs D and GPPM)</li> <li>• Completion of assessment, depositing and incorporation of well characterized mycobacterial stains in GHTM BIOBANK (with CCIs DG and GPPM)</li> <li>• Pilot study on the application of a new in vivo model for pathogenicity studies and drug discovery at GHTM (<i>G. mellonella</i> Research Hub) (WITH CCIs DDR and DG)</li> <li>• Collaborative projects w/ Angola and Mozambique on STIs and pre-natal care involving PhD students (w/ IHC).</li> <li>• Capacity building in SARS-CoV2 sequencing and molecular epidemiology in Cape-Verde- Joint-venture with Instituto Nacional de Saúde Dr. Ricardo Jorge.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Completion of the refurbishing of Laboratory in 2022</i></li> <li>• <i>Start and completion of strain deposition in 2022</i></li> <li>• <i>1 article published using G. mellonella as an infection model</i></li> <li>• <i>1 project submitted</i></li> </ul> <p>Summer 2022 – Support GHTM and INSA</p>	
<p><b>Other activities:</b></p>		
<p>Participation at International Microorganism Day Participation at IHMT-NOVA Open Day</p>	<p><i>Participation of THOP members in at least 2 open science initiatives/year</i></p>	
<p>5<sup>th</sup> GHTM Antimicrobial Resistance Awareness Day (Nov 2022)</p>	<p><i>Initiative accomplished by the end of Nov 2022</i></p>	
<p>Summer School/Course on antibiotic and biocide resistance in bacteria and OneHealth (2022) Participation in GHTM Session within several CCIs Organization and implementation of a Molecular Epidemiology Course in Angola for the CPLP countries</p>	<p><i>Initiative accomplished by the end of Sept 2022</i></p> <p><i>At least 4 GHTM sessions involving THOP members or collaborators November 2022. Endorsed by CPLP with the financial support of Fundação BAI</i></p>	



## RG – VBD

The Strategic objective of VBD is the reinforcement of local and global capacity to control vector-borne diseases. Major research competences include molecular, genetic, and eco-epidemiological studies, mechanisms of drug and insecticide resistance, transmission and vector/host-pathogen interactions, host-pathogen microbiome, vector bioecology and control, and development of diagnostic and surveillance/control innovative methods.

The main research topics of the VBD group are: Malaria, leishmaniasis, arboviruses, tick- transmitted diseases; Dispersal dynamics and phylogenetics; Drug and insecticide resistance; Host-pathogen-vector interactions; Surveillance and diagnosis.; Vector bioecology and control. The activities planned for 2022/23 fall into the various cross-cutting areas described above:

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES (to be completed in 2023)
<b>RESEARCH ACTIVITIES ONGOING IN 2022/2023 WITHIN CCIs:</b>		
<b>CCI - Diagnostics (DG)</b>		
Xenodiagnosis in domestic cats ( <i>Felis catus</i> ) naturally infected by <i>Leishmania infantum</i> (FAPESP)	Ongoing	
Leishman- European consortium European cooperation in clinical and molecular research on Leishmaniasis		
Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis	MSc dissertation + Oral /poster presentation Congress + article	
Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitanae</i> ; and <i>Leptospira spp</i>		
SUBFAM protocol: Submicroscopic <i>Plasmodium falciparum</i> infections in Guinea-Bissau: a barrier to eliminate malaria? (with Bandim Health Project, Guinea-Bissau) – ALSO WITHIN CCI FRP	ongoing PhD thesis of a local student 1 publication / Oral/poster presentation	
<b>CCI – Drug Discovery &amp; Resistance (DDR)</b>		
<b>Drug discovery &amp; resistance</b>		
Identification of new antimalarial treatments through a target-centred “drug repositioning” approach”, namely testing the effect of novel antimalarial candidates over gametocytes and the sporogonic development of malaria parasites	Discovery of new candidate antimalarials at the pre-clinical phase, which target gametocytes and the sporogonic cycle.	
Investigation of 26s, a new molecular marker for artemisinin resistance, which include studies using genomics, molecular dynamics simulations and genetic transfection.	Proposal of a new molecular marker for artemisinin resistance in malaria	
Development of PKG inhibitors as antimalarials	Discovery of PKG inhibitors, which target all malaria life cycle stages	



Application a deep learning-driven protocol to identify multistage compounds with potential for malaria treatment	Discovery of potent naphthoquinones that do not inhibit mitochondrial electron transport chain	
Repositioning one approved antipsychotic drug (TZ) in chemosensitizing resistant parasites to chloroquine (CQ)	To demonstrate that TZ chemosensitizes parasites to CQ	
Investigation the antiplasmodial activity of Caboverdian endemic plants	Discovery of extracts of some plants currently used in traditional Caboverdian medicine with antiplasmodial activity	
Vaccination trials in rabbits (Centro de Ingeniería Genética y Biotecnología, Habana, Cuba. Study under the Cytel networking.)	Evaluation of the effect of antigens in tick feeding, mortality and fertility	
<b>Insecticide Discovery &amp; Resistance</b>		
Evaluation of the effectiveness of the environmental repellent 3-(N-Acetyl-N-Butyl) Aminopropionic Acid Ethyl Ester (IR3535®), as a tool for malaria control (FBA) – WITH PPS	Participatory mapping of mosquito breeding sites (May 2022) CAP (June 2022) 1st year trial report (nov 2022) Workshop/mentorship paper writing – outcome 3-5 papers	
Repel+ New Mosquito Repellent Solutions for Malaria Control (Patent P2020) - New mosquito repellent delivery nanoparticles	Collaboration with industry New products for malaria control	
Studies on the effect of acaricides	In vitro evaluation of the effect of acaricides in tick cell lines	
Levels and mechanisms of insecticide resistance in the malaria vector <i>Anopheles coluzzii</i> of São Tomé and Príncipe (STP)	Insecticide susceptibility profile of <i>A. coluzzii</i> to insecticides commonly used for vector control in STP (UCMI framework activity)	
<b>CCI - Fair Research Partnerships (FRP)</b>		
UMAP (University of Maryland-Angola-Portugal) Malaria working group development (Presidents' Global Impact Fund) (with INIS Angola, University of Maryland, USA)	Ongoing PhD thesis of a local student - Study of <i>P. falciparum</i> demography in southwestern Africa, with a focus in Angola. Manuscript in prep (Malaria in Angola, in 2021: recent progress, challenges and future opportunities) New sample collection in several Angola provinces -	
<b>CCI - Global Pathogen dispersion and Population Mobility (GPPM)</b>		
Study of Hyalomma spp-Crimean-Congo hemorrhagic fever virus interface	Obtain tick cell lines infected with Hazara virus, the microbiome and virome of infected versus not infected tick cells.	
Study on the microbiome of ticks	Obtain the <i>Ixodes ricinus</i> microbiome using Minlon equipment (PhD work plan)	





Tick-borne pathogens detection in <i>Ixodes ricinus</i> collected in Portugal	Prevalence of infection in <i>Ixodes ricinus</i> in Portugal (PhD work plan)	
Molecular characterization of Iberian mosquitoes and viruses using multiple genetic markers and a combination of sequence analysis techniques (with Universidad - Facultad de Veterinaria de la Universidad de Extremadura and Ignacio Ruiz Arrondo: Centro de rickettsiosis y enfermedades transmitidas por artrópodos vectores/Centro de Investigación Biomédica de La Rioja (CIBIR))		
Analysis of viruses associated with ticks		
Blodless Diet	Infrastructure (insectary without blood for 1 ½ years) Implementation of a <i>A. stephensi</i> colony (blood free) 2022	
DogIPM   Immune precision medicine as a new opportunity to control canine trypanosomatid diseases		
Tackling trypanosomiasis cardiomyopathy with microRNAs and tridimensional (3D) models -miT3D (FCT – PeX)		
External collaborations beyond vector-borne diseases Detection by TouchdownPCR and genetic diversity analysis (cloning vs NGS) of mastadenovirus in waste and environmental waters the Lisbon Metropolitan area (with iBET)		
<b>CCI - Public Health Information (PHI)</b>		
MosquitoWeb (NOVA Health)	Continuing collaboration with the Newsera project (newsera2020.eu) Publications in generalist sites and social networks Podcast transmission by Rádio Belém Integration of existing dataset on GBIF and continuous update (gbif.org) (registration of the Institution ongoing)	<a href="https://www.wilder.pt/naturalist/as/este-pequeno-tigre-asiatico-e-um-invasor-que-ja-esta-em-portugal/">https://www.wilder.pt/naturalist/as/este-pequeno-tigre-asiatico-e-um-invasor-que-ja-esta-em-portugal/</a> <a href="https://radiobelem.jf-belem.pt/">https://radiobelem.jf-belem.pt/</a>
<ul style="list-style-type: none"> <li>Entomoteca HR &amp; HR – On going digitization of the collection</li> </ul>	Publish entomological collection data in the GBIF	
<b>NEW RESEARCH PROJECTS PLANNED/SUBMITTED FOR 2022/2023 WITHIN CCIs:</b>		
<b>CCI - Diagnostics (DG)</b>		
Rapid detection of Single Nucleotide Polymorphisms (SNPs) associated with drug-resistant malaria using electrochemical biosensors (GHTM) Electrochemical biosensor for the rapid detection of SNPs associated with drug-resistant malaria (PEX FCT)	Implementation of a new research project for the development of point-of-need tool on nanodiagnosis of drug-resistant malaria 1 publication, Oral/poster presentation	
Exploring Lyme Borreliosis miRNAs signature - with THOP (FCT)		



<b>CCI – Drug Discovery &amp; Resistance (DDR)</b>		
<b>Drug discovery &amp; resistance</b>		
Artificial intelligence approaches to accelerate antimalarial drug discovery for prophylaxis and transmission-blocking (FCT)	To develop new technologies artificial intelligence-driven in silico drug screening for accelerating the discovery of lead candidates to promising multi-stage antimalarials.	
Future antimalarials: towards multi-stage compounds for treatment and transmission-blocking (GHTM)	To proceed to hit-to-lead optimization of promising compounds already discovered for us, further analyzing their activity against sexual blood stages through in vivo efficacy experiments.	
Untangling the mechanisms of primaquine and tafenoquine resistance in malaria parasites through experimental evolution, genomics and transgenesis. (FCT, w/ Universidade do Minho)	<i>In vivo</i> selection of PQ and TFN resistance through continuous drug pressure over asexual stages of the rodent malaria parasite <i>Plasmodium berghei</i>	
Characterization of the phenotype and molecular profile of <i>Plasmodium falciparum</i> samples from the Brazilian Amazon as to new markers of resistance to artemisinin derivatives (PAHO)	First collection and phenotyping of <i>P. falciparum</i> isolates from the Brazilian Amazon for their response to artemisinins in vitro	
Role of a new LEISHmania DIValent cation transporter protein in macrophage infection (Submitted)		
<i>Galleria mellonella</i> Research Hub: implementation of a new in vivo model for pathogenicity studies and drug discovery at GHTM - with THOP (GHTM)		
<b>Host/Vector – Pathogen interactions and Microbiome</b>		
Pyruvate kinase deficiency and protection against malaria: exploring the underlying mechanisms and the impact on populations (FCT)		
Exploring the Hyalomma spp-Crimean-Congo hemorrhagic fever virus interface towards a preventive control of an emerging virus in Europe. (FCT)		
Exploring tick microbiome: an insight into the viral and bacterial communities in <i>Ixodes ricinus</i> and <i>Rhipicephalus bursa</i> ticks (GHTM)		
Mosquito microbiome and infection - 2 projects submitted to LaCaixa and FCT in collaboration with IST and Basel University		
<b>CCI - Fair Research Partnerships (FRP)</b>		
<b>CCI - Global Pathogen dispersion and Population Mobility (GPPM)</b>		
Mapping <i>Plasmodium falciparum</i> transmission networks in Guinea-Bissau: a molecular epidemiology approach (GHTM)	An innovative molecular approach to investigate malaria transmission networks in Guinea-Bissau, with the goal of guiding malaria control and elimination strategies in this and similar endemic settings	



<p>Integrating metavirome analysis of wastewaters into tools for surveillance of pathogenic diseases (GHM)          Analysis of zoonotic flaviviruses circulation in birds (with National Institute of Agricultural and Veterinary Research, IP - INIAV)</p>		
<p>Implementation of a <i>Toxorhynchites</i> sp. colony. Genetic and microbiome characterization and genetic manipulation. (with Faculty of Medical Technology, Prince of Songkla University, Thailand)</p>	<p>New tools for VBD control</p>	
<p><b>CCI - Public Health Information (PHI)</b></p>		
<p><b>CONGRESSES//EVENTS</b></p>		
<ol style="list-style-type: none"> <li>1. TTP10 - Tick and Tick-borne Pathogen Conference, August, 2022</li> <li>2. 15th International Symposium on Ticks and Tick-borne Diseases</li> <li>3. ILS (International leptospirosis Society Meeting (Bangkok, Thailand (November 2022 (dates will be announced; <u>or</u></li> <li>4. 16th Conference on Lyme Borreliosis and Other Tick-borne Diseases, 4 -7 September 2022, Amsterdam, Netherlands;</li> <li>5. 33rd ECCMID - 15-18 April 2023 Copenhagen, Denmark</li> <li>6. MicroBiotec'2023 (local and dates will be announced)</li> <li>7. 3rd International Caparica Conference on Leishmaniasis 2022</li> <li>8. XLVII Annual Meeting of the Portuguese Society for Immunology</li> <li>9. International congresses of Parasitology – ICOPA XV</li> <li>10. 16th CVBD@ world forum symposium</li> <li>11. ALIVE- Animal Leishmaniosis Veterinary Event, Malaga, Spain. April 2022</li> <li>12. International Congress on Leishmania &amp; Leishmaniasis - WorldLeish 7, Cartagena, Colombia</li> </ol>		
<p><b>EXPECTED PUBLICATIONS/TRAINING:</b></p>		
<p><b>Publications</b></p>		
<ol style="list-style-type: none"> <li>1 On the contribution of the rodent model <i>Plasmodium chabaudi</i> for understanding the genetics and biology of drug resistance in malaria.</li> <li>2 Mutation in a 26s proteasome subunit modulates resistance to artemisinins in malaria parasites.</li> <li>3 In vitro antiplasmodial activity of Caboverdian endemic/native plants.</li> <li>4 In vitro chemosensitization of chloroquine-resistant <i>Plasmodium falciparum</i> by TZ.</li> <li>5 Identification of potential inhibitors of casein kinase of <i>Plasmodium falciparum</i> with potent activity in vitro.</li> <li>6 Search for Plasmodium cGMP-dependent protein kinase inhibitors identifies a highly effective benzoquinoline amine compound against different life-cycle stages of malaria parasites.</li> <li>7 Discovery of potent naphthoquinones that do not inhibit mitochondrial electron transport chain identified from computational screening.</li> </ol>	<p>At least 30 papers are expected to be published in 2022</p>	



<p>8 Genetic modulation of hemolytic anemia severity and adverse clinical events in Angolan children with Sickle Cell Anemia 9 2,3-DPG and the protective effect of pyruvate kinase deficiency against malaria infection – exploring the role of the red blood cell membrane 2 Publications on tick and parasite interactions 3 publications on tick-parasite epidemiology</p> <p><b>Already published in 2022</b> Synthetic Red Blood Cell-Specific Glycolytic Intermediate 2,3-Diphosphoglycerate (2,3-DPG) inhibits Plasmodium falciparum Development In Vitro. doi: 10.3389/fcimb.2022.840968 Insect-specific viruses in the Parvoviridae family: Genetic lineage characterization and spatiotemporal dynamics of the recently established Brevihamaparvovirus genus. doi: 10.1016/j.virusres.2022.198728 Readdressing the genetic diversity and taxonomy of the Mesoniviridae family, as well as its relationships with other nidoviruses and putative mesonivirus-like viral sequences. doi: 10.1016/j.virusres.2022.198727</p>		
<p><b>Training</b></p>	<p>At least 3 and 6 concluded PhD and MSc thesis, respectively Enrollment of similar number of new students</p>	
<p><b>PhD Thesis</b> 1 PhD student, 3 months (Jan-Apr 2022), FAPESP 2018/02999-9. Resistance evaluation of tick cell lines to different acaricides. Universidade Estadual Paulista (UNESP), Campus Rio Claro/SP, Brasil 1 PhD student (2 months). Tick antigen evaluation on vaccination trials. Centro de Ingeniería Genética y Biotecnología, Habana, Cuba. CYTED NETWORK PhD student (UAlg) developing part of their thesis in the framework of ongoing research activities 1 BSc student (6 months), Tick-parasite prevalence by molecular methods. Instituto de Ciências Biomédicas da Universidade de São Paulo (ICB - USP).</p>		
<p><b>CAPACITY BUILDING</b></p>		
<p>1 Course on New approaches to project management and industrial property in health (May 2022, with Farmanguinhos, Fiocruz) 2 Hands-on Workshop on “Gene editing in Trypanosomatids: Modern approaches for identification of novel drug targets”. 3 COST-sponsored training internship: mosquito identification and phylogenetic analysis of viral sequences 4 Participation in the training activity: Entomology Summer Course, “Hands on’ Course on Arthropods of Medical and Veterinary Significance: a global perspective, from theory to practice” 5 A hands-on Workshop “Formação em técnicas <i>in vitro</i> e <i>ex vivo</i> de avaliação da suscetibilidade aos antimaláricos” organized by INS, Mozambique and IHMT-NOVA, Portugal, Maputo, May 2022 7 Hosting of Prof. Wuelton Monteiro, FMT-HVD. Erasmus + (July 2022)</p>		



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8 UCMI course on field and laboratory techniques for surveillance and control of mosquito vectors (São Tomé and Príncipe June 2022)		
<b>OTHER ACTIVITIES</b>		
Native Scientist-led "Training in Science Communication and Dissemination" ( <a href="https://www.nativescientist.com/institutions">https://www.nativescientist.com/institutions</a> ) tailored to the institution's goals and for internal researchers interested in science outreach activities.	Formalization of a group of researchers committed to science communication activities for the dissemination of IHMT major research fields and educational opportunities	
Participation at International Microorganism Day; IHMT, NOVA Open Day		
Lectures: Origin, characteristics and prevention of infections caused by SARS-CoV-2, the virus that causes COVID-19 (Escola Secundária de Cascais (March 2022)		



### CCI – DIAGNOSTICS (DG)

Objective: to develop novel diagnostic tools for epidemiological assessment and surveillance, to improve precision treatment and to provide affordable, rapid and sensitive diagnosis to field settings and/or travel medicine. This is achieved by research activity on molecular diagnostics, biomarkers, point-of-care testing and devices, lab-on-a-chip technologies addressed to infectious diseases and carried out by all Research Groups.

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES (to be filled in 2023)
<b>RESEARCH ACTIVITIES ONGOING IN 2022/2023 WITH RGs:</b>		
<b>RG – Individual Health Care (IHC)</b>		
<b>RG – Population health, Policies and Services (PPS)</b>		
<b>RG – Tuberculosis, HIV and Opportunistic Diseases (THOP)</b>		
<b>Diagnosis of sexually transmitted diseases - with IHC</b>		
Determination of the transcriptomic alterations in HDV-induced hepatocellular carcinoma (FCT)	1 article Q1	
Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis - <b>with VBD.</b>	MSc dissertation + Oral /poster presentation Congress + article	
Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitaniae</i> - <b>with VBD</b>	Oral/ poster presentation Congress + article	
<b>RG – Vector-Borne Diseases (VBD)</b>		
Xenodiagnosis in domestic cats ( <i>Felis catus</i> ) naturally infected by <i>Leishmania infantum</i> (FAPESP)		
Leishman- European consortium European cooperation in clinical and molecular research on Leishmaniasis		
Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitaniae</i> ; and <i>Leptospira spp</i>	MSc dissertation + Oral /poster presentation Congress + article	



SUBFAM protocol: Submicroscopic <i>Plasmodium falciparum</i> infections in Guinea-Bissau: a barrier to eliminate malaria? (with Bandim Health Project, Guinea-Bissau)	ongoing PhD thesis of a local student 1 publication / Oral/poster presentation	
<b>NEW RESEARCH PROJECTS PLANNED FOR 2022/2023 WITH RGs:</b>		
<b>RG – Individual Health Care (IHC)</b>		
<b>RG – Population health, Policies and Services (PPS)</b>		
<b>RG – Tuberculosis, HIV and Opportunistic Diseases (THOP)</b>		
Splicing alterations in SARS-Cov-2 infection (planned to be submitted at FCT 2023) – with CCI DG		
<b>RG – Vector-Borne Diseases (VBD)</b>		
Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant malaria and tuberculosis (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK) - <b>with THOP</b> (FCT)	Implementation of a new research project for the development of point-of-need tool on nanodiagnosis of drug-resistant malaria 1 publication Q1, Oral/poster presentation, 1 Training period in Universitat Rovira i Virgili	
Exploring Lyme Borreliosis miRNAs signature - <b>with THOP</b> (FCT)		
<b>CONGRESSES/EVENTS:</b>		
<b>PUBLICATIONS/TRAINING:</b> Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK)		
<b>CAPACITY BUILDING:</b> - New GHTM BIOMOL OMMON laboratory for Molecular detection and sequencing of pathogens - <b>with CCI GPPM</b> - Completion of assessment, depositing and incorporation of well characterized mycobacterial stains in GHTM BIOBANK - <b>with CCI GPPM</b>		
<b>OTHER ACTIVITIES:</b>		



### CCI - DRUG DISCOVERY & RESISTANCE (DDR)

Objective: to identify new therapeutic drugs (including single-encounter radical cure for malaria) and transmission-blocking, and timely detection and characterization of drug and insecticide resistance related to mutations, efflux or other mechanisms on key pathogens and vectors. In addition, tracking the prevalence and spread of drug resistance mutations allows national treatment policies to be adjusted.

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES (to be filled in 2023)
<b>CCI – Drug Discovery &amp; Resistance (DDR)</b>		
<i>Drug discovery &amp; resistance</i>		
<b>IHC</b>		
Two research projects	<ul style="list-style-type: none"> <li>. Studying the activity of repurposed drugs against Neisseria gonorrhoeae: targeting membrane transport and energy metabolism</li> <li>. Detection of azithromycin resistance in Mycoplasma genitalium</li> </ul>	
<b>PPS</b>		
Evaluation of the effectiveness of the environmental repellent 3-(N-Acetyl-N-Butyl) Aminopropionic Acid Ethyl Ester (IR3535®), as a tool for malaria control (FBA)	Participatory mapping of mosquito breeding sites (May 2022) CAP (June 2022) 1st year trial report (nov 2022) Workshop/mentorship paper writing – outcome 3-5 papers	
Repel+ New Mosquito Repellent Solutions for Malaria Control (Patent P2020) - New mosquito repellent delivery nanoparticles	Collaboration with industry New products for malaria control	
<b>THOP</b>		
Project TMC207 Calib financed by Becton&Dickinson (2021/23) Project Breakpoint Calibration for DLM, BDQ, LZD, MOX financed by EUCAST, Becton&Dickinson and ThermoFisher (2021/23) Projects FCT-MTB-EPIs and FCT-TARGETUB (ongoing 2022/23) - New INH derivatives and new EPIs against M. tuberculosis - financed by FCT/MCTES Aetiology and epidemiology of Acinetobacter baumannii through genomics to track global antimicrobial resistance – UI/BD/151063/2021 (ongoing 22/23) Gilead TB&HIV nanodiagnostics (ongoing 22/23) Inhibition of efflux in M. tuberculosis persister cells during dormancy – CEECIND/02562/2017 (ongoing 22/23)	2 articles Q1 within CCI DDR – 22/23 1 PhD thesis completed in 2023 1 MSc Thesis completed in 2022 1 national/international project submitted	
Drug repurposing for N. gonorrhoeae Molecular detection of antibiotic resistance in Mycoplasma genitalium (w/ IHC)	1 review; 2 original articles At least 2 new MSc students and 1 PhD student	





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Project BIOSAFE (ongoing) - financed by FEDER/FCT	2 articles Q1 within CCI DDR – 22/23 2 MSc Thesis completed in 2022 2 MSc Thesis completed in 2023 1 national/international project submitted	
Antimicrobial resistance in <i>S. aureus</i> causing bloodstream infections in children in Mozambique	2 original articles in 2022 1 PhD completed by 2023	
Endoperoxides against Leishmania parasites: in vitro activity and mode of action (with VBD – Sofia Cortes)	1 original article	
Molecular epidemiology of HBV in Angola: drug resistance and immune escape mutants	1 MSc Thesis completed in 2022	
<b>VBD</b>		
Identification of new antimalarial treatments through a target-centred “drug repositioning” approach”, namely testing the effect of novel antimalarial candidates over gametocytes and the sporogonic development of malaria parasites	Discovery of new candidate antimalarials at the pre-clinical phase, which target gametocytes and the sporogonic cycle.	
Investigation of 26s, a new molecular marker for artemisinin resistance, which include studies using genomics, molecular dynamics simulations and genetic transfection.	Proposal of a new molecular marker for artemisinin resistance in malaria	
Development of PKG inhibitors as antimalarials	Discovery of PKG inhibitors, which target all malaria life cycle stages	
Application a deep learning-driven protocol to identify multistage compounds with potential for malaria treatment	Discovery of potent naphthoquinones that do not inhibit mitochondrial electron transport chain	
Repositioning one approved antipsychotic drug (TZ) in chemosensitizing resistant parasites to chloroquine (CQ)	To demonstrate that TZ chemosensitizes parasites to CQ	
Investigation the antiplasmodial activity of Caboverdian endemic plants	Discovery of extracts of some plants currently used in traditional Caboverdian medicine with antiplasmodial activity	
Studies on the effect of acaricides	In vitro evaluation of the effect of acaricides in tick cell lines	
Vaccination trials in rabbits (Centro de Ingeniería Genética y Biotecnología, Habana, Cuba. Study under the Cyted networking.)	Evaluation of the effect of antigens in tick feeding, mortality and fertility	



### CCI – PUBLIC HEALTH INFORMATION (PHI)

Objective: To support public health decision making through the production of information and political decision-making tools, namely in the area of epidemiological surveillance and early detection systems:

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<p><b>Research activities ongoing in 2022/2023 with RGs:</b></p> <p>BCG vaccine to reduce unplanned absenteeism due to illness of health care workers during the COVID-19 pandemic. A multi-center randomized controlled trial.            Impacto da COVID-19 na saúde dos NPT: conhecer mais para intervir melhor            EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics            Addressing vaccine hesitancy in Europe - VAXTRUST            Determinantes e necessidades de saúde das crianças migrantes num contexto de pandemia: Um estudo longitudinal para a Região de Lisboa e Vale do Tejo, Fundação para a Ciência e a Tecnologia, Portugal (PTDC/SAU-SER/4664/2020)            Health literacy in times of coronavirus and COVID-19: the COVID-HL school survey</p>	<p>At least three papers published in Q1 PH journal resulting from the ongoing research activities</p>	
<p><b>New Research Projects planned for 2022/2023 with CCIs:</b></p> <p>Study of antimicrobial resistance and genotypes of <i>M. genitalium</i> (DDR) (planned to be submitted at FCT 2023) (WITH CCI DDR)            Non specific effects of BCG in under-five children, Fundação para a Ciência e a Tecnologia, Portugal (EXPL/SAU-EPI/0067/2021)            Risk of mortality and morbidity after vaccination against SARS-CoV-2 in Continental Portugal: total population, special exposure retrospective cohort study</p>	<p>At least one project submitted to the FCT 2022 call            At least one project initiated in 2022</p>	
<p><b>Congresses//Events:</b></p> <p>European Congress of Public Health</p>	<p>At least one presentation accepted at at least 3 international congress/events in the PHI field</p>	
<p><b>Publications/Training:</b></p>	<p>At least 3 publications in Q1 journals in the field of public health            At least 50% of the IHMT researchers with a GCP certificate</p>	
<p><b>Capacity building:</b></p> <p>Short training sessions on PHI issues            Master in Field Epidemiology Training for Portuguese-speaking West African Countries EDCTP, CSA Capacity development for disease outbreak and epidemic response in sub-Saharan Africa, in collaboration with Africa CDC (CSA 2020 E 3113)</p>	<p>At least three training sessions/ courses on PH issues to IHMT/GHMT community</p>	
<p><b>Other activities:</b></p>		



### CCI - GLOBAL PATHOGEN DISPERSION AND POPULATION MOBILITY (GPPM)

Objective: addresses global dispersion of infectious diseases using transdisciplinary and integrated approaches in collaboration with partners in endemic countries. Our aim is to understand the factors that underpin the spread or containment of infectious diseases globally and locally, particularly environmental changes and population mobility, in control or elimination contexts.

ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<b>Research activities ongoing in 2022/2023 with RGs:</b>		
<b>RG – Individual Health Care (IHC)</b>		
Research Project: Malaria control and elimination: addressing the occult parasite reservoir. PI: Marcelo U. Ferreira (IHC). Funding: FCT (UID/04413/2020)		
Research project: "Imigrantes Guineenses em Portugal: noção de riscos e de cuidados necessários em viagens ao país de origem". Team: Jaime Tchuda (PhD student), Rosa Teodósio (IHC).	MSc thesis of Jaime Tchuda. Supervisor: Rosa Teodósio. Ongoing.	
Research project: "Parasitas intestinais em comunidades migrantes do município do Seixal". Team: Tanya Jasse (MSc student), Rosa Teodósio (IHC), Manuela Calado	MSc thesis of Tanya Jasse. Supervisor: Rosa Teodósio. Ongoing.	
"Strongyloides stercoralis: prevalência e transmissão em comunidades vulneráveis" Team: Damarize Carinton (MSc student), Rosa Teodósio (IHC), Isabel Mauricio.	MSc thesis of Damarize Carinton. Supervisor: Rosa Teodósio. Ongoing.	
<b>RG – Population Health, Policies and Services (PPS)</b>		
Implementation of 2 cohort studies for native and migrant children in 5 Municipalities of Lisbon Region: 2 <sup>nd</sup> wave of data for Amadora Municipality 1 <sup>st</sup> wave of data for Barreiro, Moita, Montijo and Alcochete Municipalities	<i>Databases on children's health profile; databases on health care access by natives and migrant children; evidence on refugee's access to healthcare during covid-19 in Lisbon region;</i>	
Implementing a study on the impact of covid19 on migrant's health in Amadora Municipality, funded by FAMI	<i>Databases on covid19 mortality and mobility by immigrants status; database on covid19 incidence by immigrant status;</i>	
EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics	<i>Samples from SARS-CoV-2 infected children Database on outbreaks and epidemiology of SARS-CoV-2 in schools</i>	
<b>RG – Tuberculosis, HIV and Opportunistic Diseases (THOP)</b>		



Project REDETB – Early diagnostics, phylogeography, dispersion and epidemiology of M/XDR-TB in Brasil as part of the CPLP-TB consortium and platform	1 article Q1 within CCI GPPM – 22/23 1 international project submitted	
Genome diversity of rotavirus in Mozambique	1-2 papers in Q1	
EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics	Samples from SARS-CoV-2 infected children Database on outbreaks and epidemiology of SARS-CoV-2 in schools Clinical trial of Lolli method for diagnosis of SARS-CoV-2 in schools	
<b>RG – Vector-Borne Diseases (VBD)</b>		
Study of Hyalomma spp-Crimean-Congo hemorrhagic fever virus interface	Obtain tick cell lines infected with Hazara virus, the microbiome and virome of infected versus not infected tick cells.	
Study on the microbiome of ticks	Obtain the Ixodes ricinus microbiome using Minlon equipment (PhD work plan)	
Tick-borne pathogens detection in Ixodes ricinus collected in Portugal Molecular characterization of Iberian mosquitoes and viruses using multiple genetic markers and a combination of sequence analysis techniques	Prevalence of infection in Ixodes ricinus in Portugal (PhD work plan)	
Analysis of viruses associated with ticks		
Blodless Diet	Infrastructure (insectary without blood for 1 ½ years) Implementation of a A. stephensi colony (blood free) 2022	
DogIPM   Immune precision medicine as a new opportunity to control canine trypanosomatid diseases		
Tackling trypanosomiasis cardiomyopathy with microRNAs and tridimensional (3D) models -miT3D (FCT – PeX)		
<b>New Research Projects planned for 2022/2023 with CCIs:</b>		
Next-generation sequencing to understand the HIV-1 transmission patterns in Angola (HITOLA)	NGS sequences of HIV-1 patients from Angola Database linking genomic data to socio-demographic questionnaires	
MARVEL: Minimizing the emergence and dissemination of HIV-1 drug resistance in PALOPs through an evidence-based portable high-throughput sequencing and computational approach. (PTDC/SAU-PUB/4018/2021)	NGS sequences of HIV-1 patients from Cabo Verde, São Tomé e Príncipe and Moçambique Database linking genomic data to socio-demographic questionnaires	



SARS-CoV-2 genomic epidemiology and surveillance in Cabo Verde (with THOP)	NGS sequences of SARS-CoV-2 patients from Cabo Verde	
Study of antimicrobial resistance and genotypes of <i>M. genitalium</i> (DDR) (planned to be submitted at FCT 2023) (VBD - WITH CCI DDR)		
Mapping Plasmodium falciparum transmission networks in Guinea-Bissau: a molecular epidemiology approach (GHTM) (VBD)	<i>An innovative molecular approach to investigate malaria transmission networks in Guinea-Bissau, with the goal of guiding malaria control and elimination strategies in this and similar endemic settings</i>	
Integrating metavirome analysis of wastewaters into tools for surveillance of pathogenic diseases (GHTM) (VBD)		
Analysis of zoonotic flaviviruses circulation in birds (with National Institute of Agricultural and Veterinary Research, IP - INIAV) (VBD)		
Implementation of a Toxorhynchites sp. colony. Genetic and microbiome characterization and genetic manipulation. (with Faculty of Medical Technology, Prince of Songkla University, Thailand) (VBD)	<i>New tools for VBD control</i>	
Research Project: Population genomics of malaria introduction in the Americas. PI: Marcelo U. Ferreira. To be submitted to La Caixa Foundation. (IHC)	<i>Starting date (if funded): 09/2023</i>	
Research Project: Mapping Plasmodium falciparum transmission networks in Guinea-Bissau: a molecular epidemiology approach. PI: Márcia M. Medeiros (VBD). Collaborators: Marcelo U. Ferreira (IHC), Ana Paula Arez (VBD). Submitted to GHTM/IHMT-NOVA Call for Proposals 2022	<i>Starting date (if funded): 05/2022</i>	
Implementation of a children cohort study in Santiago Island, Cape Verde		
<b>Other activities:</b>		



### CCI – FAIR RESEARCH PARTNERSHIPS (FRP)

Objective: To actively promote fair and equitable partnerships - with the assumption that we can contribute to increased productivity if: the definition of the research agenda results from joint work; clarification of responsibilities and promotion of mutual learning (“reverse innovation”); there is data sharing and research networks.

ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES ( to be filled in 2023)
<p><b>Research activities ongoing in 2022/2023 with RGs:</b></p> <p>Iniciativa para o reforço dos serviços sanitários de primeiro e segundo nível em Angola. Promoter: Centro per le Malattie Tropicali Ospedale Sacro-Cuore Don Calabria, Verona, Italy, IHMT partner.</p> <p>SUBFAM protocol: Submicroscopic <i>Plasmodium falciparum</i> infections in Guinea-Bissau: a barrier to eliminate malaria? (with Bandim Health Project, Guinea-Bissau)</p> <p>UMAP (University of Maryland-Angola-Portugal) Malaria working group development (Presidents’ Global Impact Fund) (with INIS Angola, University of Maryland, USA)</p>	<p>ongoing PhD thesis of a local student            1 publication / Oral/poster presentation</p> <p>Ongoing PhD thesis of a local student - Study of <i>P. falciparum</i> demography in southwestern Africa, with a focus in Angola.            Manuscript in prep (Malaria in Angola, in 2021: recent progress, challenges and future opportunities)            New sample collection in several Angola provinces -</p>	
<p><b>New Research Projects planned for 2022/2023</b></p> <p>Gender equality in immigration integration policies: pathways for immigrant women empowerment (planned to be submitted Horizon)</p> <p>HEROES - HEalth woRkOrce to meet healht challEngeS (submitted Call: EU4H-2021-JA2-IBA - Joint actions wave 2)</p>		
<p><b>Congresses//Events:</b></p>		
<p><b>Publications/Training:</b></p>	<p>At least 3 publications in the field of global health (focused on FRP issues)</p>	
<p><b>Capacity building:</b></p> <p>Short training sessions on Fair Research Partnership            Institutional cross-cutting training session (<i>Formação transversal</i>) on the subject PhD Tropical Diseases and Global Health, UC Rotação Temática – Fair Research Partnerships</p>	<p>(10 students enrolled; final output: 2 papers on the subject)</p>	
<p><b>Other activities:</b></p>		



## BIOLOGICAL RESOURCE CENTER (BRC) / BIOBANK

Coordinated by two members of the VBD group, transversal activity to all RG and CCIs, but particularly aligned within DG, DDR and GPPM.

PROPOSED ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES (to be filled in 2023)
<p><b>RESEARCH ACTIVITIES ONGOING IN 2022/2023</b></p> <p>Ongoing implementation of the <i>Strategic Plan 2021-2023</i> (<a href="http://ihmtweb.ihmt.unl.pt/Download/BIOTROP/BIOTROP_2021-2023_STRATEGIC_PLAN_vsf.pdf">http://ihmtweb.ihmt.unl.pt/Download/BIOTROP/BIOTROP_2021-2023_STRATEGIC_PLAN_vsf.pdf</a>), namely:</p> <ul style="list-style-type: none"> <li>- priority to implement approved procedures with the Traveler's Clinic and Central Laboratory of IHMT</li> <li>- interaction with National Roadmap for Research Infrastructures (RNIE) networks (Pt-mBRCN /MIRRI-PT and Biobanco.pt)</li> <li>- increase the network with national similar infrastructures (e.g. INSA biobank, Veterinary Faculty of Lisbon)</li> <li>- establish collaboration with potential stakeholders at Portuguese-speaking countries (especially PALOP and Brazil)</li> <li>- implement a sample quality plan</li> <li>- requalify retrospective/historical collections</li> <li>- promote the integration of prospective collections</li> <li>- search for collaborations within pharmaceutical and biotechnology industry</li> <li>- create a BIOTROP bilingual website</li> </ul>	<p>Storage of samples positive for the presence of pathogens from a variety of endemic areas – Prospective collections</p> <p>Knowledge/technology transfer and funds from FCT as network member</p> <p>Biobank extended network at national and international level (CPLP)</p> <p>Increase the biological resources and samples quality control/quality assurance</p> <p>Create the BIOTROP (micro)site to promote resources and services within the national and international scientific community and biotech industry</p>	
<p><b>NEW RESEARCH PROJECTS PLANNED FOR 2022/2023:</b></p> <p><b>Under evaluation</b></p> <p>Submission of Expression of Interest regarding RNIE by both networks (Pt-mBRCN /MIRRI-PT and Biobanco.pt), FCT</p> <p><b>To be submitted</b></p> <p>Proposal to the next funding cycle for the RNIE announced by FCT through the Portugal 2030 program.</p>	<p>Funds from FCT as RNIE networks member</p> <p>Update, modernization and strengthening for the period 2022-2027.</p>	



<p><b>CONGRESSES//EVENTS:</b></p> <p><b>International scientific conference</b>        ESBB Africa Conference 2022</p> <p><b>Internal scientific sessions</b>        GHTM CCI Diagnostics</p>	<p>1 Oral communication (presentation of the Biotropical Resources infrastructure)</p> <p>1 Oral communication</p>	
<p><b>PUBLICATIONS/TRAINING:</b></p> <p><b>Publications on:</b></p> <p>- <i>Creating value in health sciences – implementation of biobanks in infectious and chronic diseases: A Review</i> – joint article with CHRC biobank (CHAIN)</p> <p>- <i>An overview of current (tropical) infectious disease biobanks, their usage, regulatory and procedure standards for the sample and data, etc.</i> - joint article with ETOP IBCSG Partners Foundation</p> <p><b>Training:</b></p> <p>- Visit to Fundação Oswaldo Cruz/FIOCRUZ, Rio de Janeiro, Brazil under the ICM NOVA - International Credit Mobility project, Erasmus+ Program.</p>	<p>2 publications (reviews)</p> <p>Training on the best practices in the management and requalification of biological collections</p>	
<p><b>CAPACITY BUILDING:</b></p>		
<p><b>OTHER ACTIVITIES:</b></p> <p>Participation in science outreach activities (e.g. Noite Europeia dos Investigadores, Open Day IHMT, Ciência VIVA FCT, etc)</p>	<p>Dissemination of biobank activities to general public, especially targeting “young scientists”</p>	





## VIASEF

ACTIVITIES	EXPECTED OUTCOMES	EVIDENCES (to be filled in 2023)
<p><b>RESEARCH ACTIVITIES ONGOING IN 2022/2023</b>            Ongoing projects associated to VIASEF and other insectaries</p> <p>2MSc projects ongoing</p> <p>Lifetable and vector competence studies of <i>Anopheles coluzzii</i> from São Tomé and Príncipe</p>	<p>activities on the areas of anti-vector and anti-malaria products, host parasite interactions, vector physiology and parasite biology            further details at *</p> <p>In the framework of the UCMI, a comparison between transgenic and non-transgenic lines of <i>Anopheles coluzzii</i> from São Tomé island will be performed for <i>P. falciparum</i> infectivity and lifetable traits</p>	
<p><b>NEW RESEARCH PROJECTS PLANNED FOR 2022/2023</b>  <b>Under evaluation</b></p> <p>Submission of Expression of Interest regarding RNIE to FCT - joint proposal with an existing Infrastructure, CONGENTO (<a href="https://congento.org">https://congento.org</a>), another infrastructure from the Portuguese Road Map.</p> <p>Experimental <i>P. falciparum</i> infections are predicted in the following projects:</p> <p>LaCaixa, CaixaResearch Health 2022, HR22-00633 - The impact of mosquito microbiome and biofilm producing bacteria on malaria transmission. Partner Institutions: Instituto Superior Tecnico, Portugal and Department for Biomedical Research - University of Bern, Switzerland. (submitted)</p> <p>- Changes in malaria transmission associated with biofilm-producing microbiota in the midgut of the mosquito vector. Partner Institutions: Instituto Superior Tecnico, Portugal and Department for Biomedical Research - University of Bern, Switzerland. (submitted)</p> <p>- Targeting Plasmodium glycans for multistage antimalarial vaccination (PI: Susana Ramos). Partner Institutions: IGC, Portugal and INS, Mozambique. (submitted)</p>		
<p><b>CONGRESSES//EVENTS</b></p>		



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<p><b>PUBLICATIONS/TRAINING</b>          Short training course           Road Map</p>	<ul style="list-style-type: none"> <li>- Security in BCL3 and ACL3.</li> <li>- Using the VIASEF (obligatory to use the infrastructure)</li> </ul> <p>Activities to publicize the infrastructure.</p>	
<p><b>CAPACITY BUILDING</b></p>	<ul style="list-style-type: none"> <li>- Promote the use of the infrastructure within the institution and outside</li> <li>- Finalize regulation for use and management</li> <li>- Implement reference mosquito colonies</li> <li>- Expand the ongoing projects with industry</li> </ul>	
<p><b>OTHER ACTIVITIES</b>          VIASEF, IHMT-NOVA – US Embassy Lisbon, Portugal – International Visitor Leadership Program from the US Department of State</p>		<p><a href="https://www.ihmt.unl.pt/viasef-ihmt-nova-embaixada-dos-eua-lisboa-cientistas-portugueses-e-norte-americanos-partilham-experiencias/">https://www.ihmt.unl.pt/viasef-ihmt-nova-embaixada-dos-eua-lisboa-cientistas-portugueses-e-norte-americanos-partilham-experiencias/</a></p>

- [Web link](#)