IrsiCaixa Scientific Report 2024

IrsiCaixa

"la Caixa" Foundation

Generalitat de Catalunya
Departament de Salut

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IrsiCaixa

Letter from the director

Established in 1995 with the backing of the "la Caixa" Foundation and the Department of Health of the Autonomous Government of Catalonia, **IrsiCaixa** was formed to combat the HIV/AIDS crisis. With Dr. Bonaventura Clotet at the helm, **IrsiCaixa** has evolved into a renowned international institution and a frontrunner not only in HIV/AIDS research, but also in other established and emerging infectious diseases. Dr. Clotet also holds the position of president and founder of the Fight Infections Foundation.

The collaborative hub formed by the proximity of **IrsiCaixa** and the Fight Infections Foundation within the Germans Trias i Pujol University Hospital fosters a distinctive model of cooperation among researchers, healthcare professionals, patients, and community representatives, facilitating the exchange of knowledge and innovative solutions.

With 30 years of experience in HIV/AIDS research, **IrsiCaixa** has cultivated extensive expertise in the fundamental aspects of human health, particularly the immune system. Leveraging this knowledge, the institute's 11 research groups and more than 130 staff members address key challenges in human health across six strategic lines: global infectious diseases (including HIV/AIDS and SARS-CoV-2), emerging infectious diseases, immunopathology, microbiome, cancer and the development of new therapies and vaccines.

2024 has been a year of expanding knowledge. What began in 1995 as a small group of individuals dedicated to studying HIV during the most uncertain moments of the pandemic has grown now into **IrsiCaixa**, an institution with over 100 researchers working across a wide range of biomedical science fields. This growth reflects not only our adaptability but also our ambition to contribute to global knowledge and well-being by providing solutions to emerging biomedical challenges.

HIV remains a cornerstone of our center, and we have internationally renowned experts who continue to advance this field with the goal of eradicating the disease. In 2024, the **IrsiCaixa** team participated in identifying the world's first case of HIV cure following a stem cell transplant without relying on the usual protective mutation. This discovery, within the framework of the IciStem international consortium co-led by **IrsiCaixa**, adds to previously documented cases and confirms a crucial hypothesis: it is possible to cure HIV through pathways alternative to the protective mutation. Additionally, in 2024, **IrsiCaixa** reached a major milestone: the HIV vaccine developed at our center was acquired by Gilead, a leading pharmaceutical company that will incorporate this asset into its strategy against the disease.

Our scientific curiosity and expertise in infections and the immune system have driven us to explore beyond HIV and fully enter the field of infectious diseases. We are now also researching diseases such as COVID-19. In 2024, we published results on an effective vaccine with optimized production compared to existing ones, as well as an antibody effective against all virus variants. We are also coordinating a European project to develop treatments and vaccines against West Nile virus, an infection currently lacking therapeutic options, and advancing the development of a syphilis vaccine, among other emerging infections requiring urgent attention.

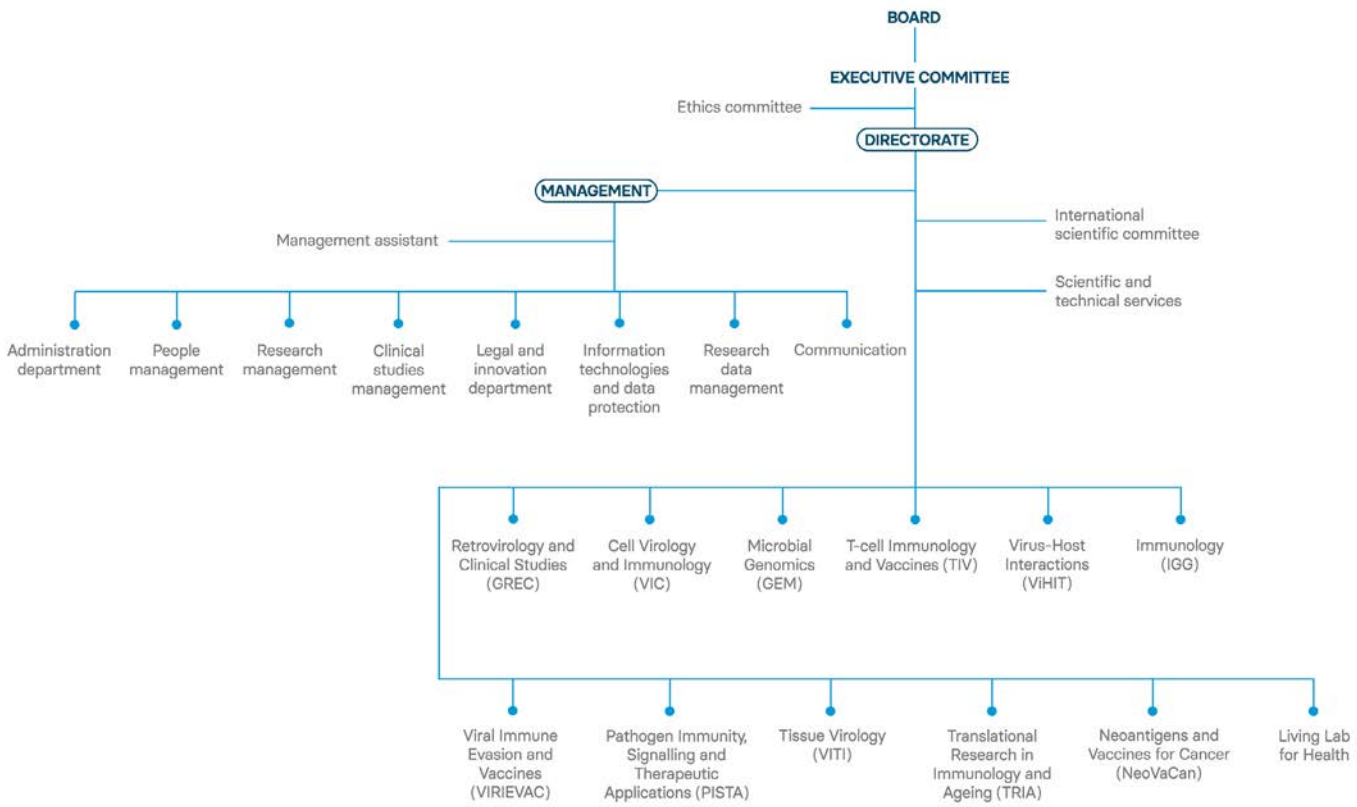
In areas seemingly distant from infectious diseases and immunity, we are investigating the role of retrotransposons in slowing Alzheimer's progression. In the field of cancer, we are working on vaccines designed to activate the immune system against cancer cells. In 2024, we published a vaccine against melanoma based on Virus-Like Particles (VLPs). All these advances are possible thanks to the solid foundation and platforms we have developed over the years studying HIV, as well as the accumulated knowledge about the immune system and infections.

None of this would have been possible without the dedication and talent of the people who are part of **IrsiCaixa**, nor without the support of individuals and institutions who trust in our work, such as the "la Caixa" Foundation and the Generalitat of Catalonia. We work to honor those who were there at the beginning of this journey, while also embracing new challenges and welcoming the individuals who join this project every day. We believe in scientific excellence, and we are committed to it, to address the challenges posed at every stage by global health and to contribute to improving people's lives.

Bonaventura Clotet Sala

IrsiCaixa director

Organizational structure



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Health Minister of the Autonomous Government of Catalonia

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Appointee of the Fundació Bancària Caixa d'Estalvis i Pensions de Barcelona "la Caixa" ("la Caixa" Foundation)

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Marta Casals i Virosque
Appointee of the Fundació Bancària Caixa d'Estalvis i Pensions de Barcelona "la Caixa" ("la Caixa" Foundation)

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Anna Veiga i Lluch
Appointees of the Board of the Fight Infections Foundation

Vice-Secretary (non board)
Sara Freire i Garcia
Appointee of the IrsiCaixa board

Organizational structure

Executive Committee

For "la Caixa" Foundation:

Esther Planas i Herrera
President

Marta Casals i Virosque
Secretary

Ignasi López Verdaguer

For the Department of Health of the Autonomous Government of Catalonia:

Jordi Barretina i Ginesta
Jordi Casabona i Barbarà
Montserrat Llavayol i Giralt

Director

Dr. Bonaventura Clotet Sala

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Cristina Mesa Real
Penélope Riquelme Nevado

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Julián Eslava Campo
Gabriel Rodrigo Martínez

International Scientific Committee

Dr. Daria Hazuda
Merck's Vice President of Infectious Diseases Discovery, Chief Scientific Officer of MRL Cambridge Exploratory Science Center (Massachusetts, USA).

Dr. Daniel Kuritzkes
Professor of Medicine at Harvard Medical School, Director of AIDS Research at Brigham and Women's Hospital and Co-Director of the NIH-funded AIDS Clinical Trials Group (USA).

Dr. Douglas Richman
Professor of Pathology and Medicine at the University of California San Diego (UCSD) (USA). Director of the Research Center for AIDS and HIV Infection at the VA San Diego Healthcare System and Director of the Center for AIDS Research at the University of California San Diego (UCSD) (USA).

Dr. Gabriella Scarlatti
Head of the Viral Evolution and Transmission Group at the IRCCS Ospedale San Raffaele (Milano, Italy).

Dr. Jonathan Schapiro
Director of the HIV/AIDS Clinic at the National Hemophilia Center (Tel Aviv, Israel).

Dr. Lucy Dorrell
Senior Director of the Infectious Diseases and Clinical Development at Immunocore and professor at the Oxford University (UK).

Dr. Mario Stevenson
Head of the Infectious Diseases Division (Department of Medicine) of the University of Miami (Florida, USA).

Dr. Monique Nijhuis
Associate Researcher of Translational Virology of the Department of Medical Microbiology, University Medical Center (Utrecht, the Netherlands).


ACCESORIOS
Nikon

Key figures 2024

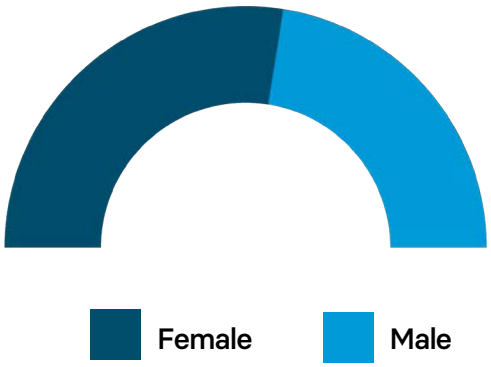
Total staff

129

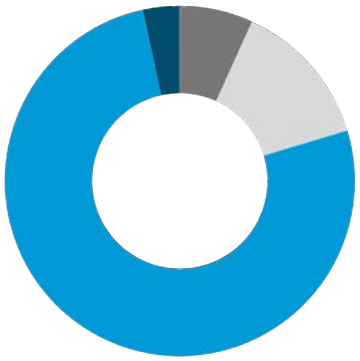
Sex

67% ♀ **33%** ♂

Principal investigators



Staff by categories



- Scientific and technical Services (6%)
- Administration and research support (17%)
- Research (74%)
- Living Lab for Health (3%)

2 Theses defended in 2024

Ángel Bayón Gil
Retrovirology and Clinical Studies (GREC)

Miguel Marín López
Viral Immune Evasion and Vaccines (VIRIEVAC)

Projects awarded

28

19 public

9 private

Active projects

120

76 coordinated by IrsiCaixa

Publications

71

657 Impact Factor

Highlights 2024

February

IrsiCaixa and BSC developed a new algorithm to identify highly immunogenic neoantigens, leading to the creation of VLPs vaccines that slow **melanoma** progression and improve survival in preclinical models.

March

IrsiCaixa, IRTA-CReSA, BSC and Grifols developed two promising **COVID-19 vaccine candidates** which showed strong protective immune responses in preclinical models.

May

The **People in Red** solidarity gala, held at Barcelona's MNAC, raised over €800,000 for infectious diseases research, uniting 700 attendees, including celebrities and business leaders, to support this vital cause.

June

IrsiCaixa wins the Patentability Study Award at the **Innomed Awards** for its pancreatic cancer vaccine platform. The institute also presents an immunotherapy project for HIV cure.

July

IrsiCaixa and CRG discovered that mobile DNA fragments in Down syndrome can be regulated by **lamivudine**, an HIV antiretroviral, offering promising potential for new therapeutic strategies.

August

IrsiCaixa and the Fight Infections Foundation found that individuals with and without HIV experienced similar severity and recovery times from **mpox**.

September

The IciStem consortium, co-led by IrsiCaixa, confirmed the **Geneva patient** as the sixth person in HIV remission after a stem cell transplant, with no detectable virus 32 months after stopping treatment.

October

IrsiCaixa identified five South African children who maintain undetectable HIV levels without antiretroviral therapy, linked to a low-activity virus and a sensitive immune response.

November

Gilead Sciences acquired the HTI HIV vaccine assets from **AELIX Therapeutics**, a spin-off of IrsiCaixa, advancing HIV cure strategies.

December

IrsiCaixa joins the $18M Opti-FliP international project to develop a **preventive HIV vaccine**, receiving $2M from NIH funding.

Research groups

Viral Immune Evasion and Vaccines (VIRIEVAC)

PROJECTS AWARDED

Optimal T-cell support for HIV neutralizing antibody induction to fusion peptide-inclusive regimens (Opti-FliP)
Funding: NIH
Participating entities: IrsiCaixa, UC Davis, UC San Francisco, University of New Mexico, Columbia University, Wits Health Consortium, Emory University
Starting and finishing date: 12/24-01/30
Principal investigator: Christian Brander

Joan Oró fellowship
Funding: AGAUR
Participating entities: IrsiCaixa
Starting and finishing date: 04/24-03/27
Principal investigator: Laia Bernard Rosa

AWARDS AND ACHIEVEMENTS

Julia García Prado, member of the scientific committee of GESIDA 2024.
Julia García Prado, member of the Joint Access Advisory Mechanism (JAAM) for European ATPs.
Julia García Prado, member of the Sociedad Española de Inmunología.
Raul Pérez Caballero, member of the European Federation of Animal Science (EAAP)
Miguel Marín López, awarded Summa cum laude for his PhD thesis entitled *Immunotherapeutic strategies for HIV cure: Advancements in the characterisation and development of novel immune checkpoints therapeutics for combinatorial HIV-1 immune interventions* (UPF).

Presentation

The VIRIEVAC group focus on the identification of functional boundaries of viral pathogenesis and the role of antiviral T-cell responses to control or eliminate viral infections. From a basic-translational perspective, VIRIEVAC combines virology, cellular immunology, and bioinformatics in the study of virus-immune interactions to understand the role played by T-cells in controlling HIV-1 and SARS-CoV-2 infections. Its ultimate goal is, by defining the functional features behind long-term effective cellular immunity against viral infections, to develop innovative tools for immune monitoring and immunogenicity and effective immune therapeutics.

2024 milestones

Milestones in the past year within **IrsiCaixa**'s strategic lines were as follows:

— Therapies and vaccines. In the line of therapies and vaccines this year Virievac continues to lead two European initiatives inside de areas of vaccines (RBDCOV) and therapeutics (LWNVIVAT) against viral infections. Our group is leading the immune monitoring (WP5) of two clinical trials of COVID vaccine using the HHPV1 HIPRA vaccine in the context of vulnerable populations, immunodeficiencies (HH4-trial) and paediatrics (HH-3 trial). In addition, this year the group is leading the development of novel immunogenicity tools (WP4) to test therapeutics against West Nile virus. The generation of novel immunogenicity tools using tonsil organoids as platform of predictive immunogenicity of therapeutics has been a priority together with the design of immunogens. These studies materialized in a publication (Fernández MJ et al, Vaccines), 4 scientific communications in national and international conferences.

— Persistence, remission, and HIV cure. This research line has been successful and in continuous expansion during this year. Currently funded by several projects lead by Dr Prado (PI22/01120, RECOVIR) our findings have provided the rational developed several prototypes as tested in preclinical models of LCMV infection in mouse. Our findings support the targeting of the CD155/TIGIT axis in combination with anti-PDL1 to reduce the viral reservoir in chronic infection through the recovery of immune exhaustion (Patent submitted 2024). In addition, ongoing efforts in the development of novel HIV RNA therapeutics (HIV-Lite) have provide initial data on efficacy (Patent filling 2024). Also, we have been reinforcing the development of novel preclinical models both in tonsil organoids and murine and implement human humanized mouse models in our setting. These studies materialized in a collaborative publication (Panisiello C et al, J Immunother Cancer) and 6 scientific communications in national and international conferences. This research has led to successful national and international collaborations (Buzon's Lab, VHIR, Barcelona; Menendez

6 Peer review publications in international scientific journals

11 Presentations in scientific conferences

2 Patents

Research group leader
Julia García Prado

Research scientist
María Lázaro Díez

Postdoctoral researcher
Raúl Pérez Caballero

Predoctoral researchers
Laia Bernad Rosa
Miguel Marín López
Eudald Vehí Piqué

Senior laboratory technicians
Santiago Cavero Martínez
Ruth Peña Poderós

Data scientist
Gabriel Felipe Rodríguez Lozano

Lab; IJC, Barcelona; Martin-Gayo Lab, UAM, Madrid; Alvarez-Vallina lab, CNIO- H12O, Madrid; Kloverpris Lab, African Health Research Institute, South Africa).

— **SARS-CoV-2 and COVID-19.** VIRIEVAC is characterizing SARS-CoV-2 T cell responses in multiple study groups in the context of natural and vaccine induce immunity in the context of multiple cohort studies (the King and the Prohepic19 cohorts) and identify the functional traits of long-term T cell immunity. During this year we focus in the sequalae of COVID infection in the form of Long COVID (SLT021/21/000038, SLT021/21/000055) working with clinicians and immunologist to address and improve the clinical characterization and definition of Long COVID with a particular interest in the contribution of sustained T cell responses and the nature of those.
These studies materialized in 4 publications (Toran Montserrat, Public HS, Dacosta-Aguayo, Front Neurol, Carmona-Cervello, Front Med and Dacosta-Aguayo, AJNR Am J Neurol) and 2 scientific communications in national and international conferences.

Perspectives for the future

For the next future, VIRIEVAC aims to:

— Consolidate an organoids immunogenicity platform for therapeutics against viral infections.

— Bring novel insights into the mechanism of immune recovery in HIV through CD155/TIGIT regulation and advance the validation of RNA HIV-lite immunotherapeutic into relevant in vivo models.

— Evaluate the role of T cell responses in COVID infection and beyond in Long COVID and NeuroCOVID. Increase and strength our internationalization through new alliances and collaborations with research groups of excellence across Europe, USA and Africa in the search of international projects in the strategic areas.

Microbial Genomics (GEM)

AWARDS AND ACHIEVEMENTS

Roger Paredes, science co-chair of the Strategies and Treatments for Respiratory Infections & Viral Emergencies (STRIVE) Network funded by the National Institutes of Health (NIH) and the National Institute of Allergy and Infectious Diseases (NIAID).
Roger Paredes, member of the Steering Group of the Asia Pacific Economic Cooperation (APEC) Clinical Practice Guideline for Long COVID Diagnosis, Treatment, and Management.
Roger Paredes, participant of the Spanish SEIMC Guidelines on the Clinical Management of COVID-19.
Roger Paredes, member of the IAS-USA Core Faculty and HIV Drug Resistance Group.

Presentation

Our group investigates microbiome factors that affect immune regulation in HIV infection, acute respiratory infections, and virus-related cancers by using microbial metagenomics and various multiomics assessments. The specific objectives of our research include understanding the influence of gut and vaginal microbes on the effectiveness of HIV vaccines, characterizing host-microbiome interactions that contribute to severe clinical outcomes in acute respiratory infections, and identifying novel therapeutics for HIV, Covid-19 and other acute respiratory infections. Our work stems from basic and translational research in the lab but aims to inform clinical management and public health policy.

2024 milestones

— We have advanced the work in the large EU Funded MISTRAL project.

— We have advanced in our projects with the Canadian Institutes of Health Research.

— We have identified better treatments for COVID-19 in immunocompromised individuals.

— We have participated in the development of a WHO target product profile for HIV drug resistance tests and continued to work in WHO HIV Drug resistance group.

Perspectives for the future

We expect to continue the work initiated in through the H2020-funded MISTRAL project to understand the role of the microbiome in HIV vaccine responses, chronic cardiovascular complications and cervical cancer. We will strengthen our work in the pathogenesis of acute respiratory infections and will apply AI tools to determine the specific microbiome-derived ligands that enact immune modulation.

2 Publications in The Lancet Infectious Diseases journal

2 Publications in Nature Communications journal

1 Publication in The Lancet Microbe journal

4 Publications in Clinical Infectious Diseases journal

Research group leader
Roger Paredes

Research scientists
Maria Casadellà Fontdevila
Aleix Elizalde Torrent

Bioinformatics research associate
Alessandra Borgognone

Bioinformatics postdoctoral researchers
Oriol Careta Borràs
Francesc Català Moll

Web developer
Valentina Triviño Vence

Predoctoral researcher
Nel Marín Sánchez

Laboratory technician
Mariona Parera Sallent

T-cell Immunology & Vaccines (TIV)

PROJECTS AWARDED

Optimal T-cell support for HIV neutralizing antibody induction to fusion peptide-inclusive regimens (Opti-FliP)
Funding: NIH
Participating entities: IrsiCaixa, UC Davis, UC San Francisco, University of New Mexico, Columbia University, Wits Health Consortium, Emory University
Starting and finishing date: 12/24-01/30
Principal investigator(s): Christian Brander

Regulatory role of CD8+ T follicular cytotoxic (TFC) cells induced by vaccination and implication in HIV infection control (8+FIGHT)
Funding: MICIU-AEI
Participating entities: IrsiCaixa
Starting and finishing date: 09/24-08/28
Principal investigator(s): Alexandre Olvera van der Stoep

AWARDS AND ACHIEVEMENTS

TIV, acquisition of the IrsiCaixa spin-off AELIX Therapeutics by Gilead Sciences, marking a significant success for both the institution and the research team.
Marta Ruiz-Riol, coordinator of the *Boosted Flow Cytometry as a Diagnostic and Monitoring Tool for Virus/Pathogen-Specific T-Cell Immune Profiles in HIV, TB, and COVID Diseases* project, successfully led it to completion.

Presentation

Strong, pathogen-specific cellular and humoral immune responses are a critical component of the immunity against the acquisition of viral infections. In chronic infection, these responses are also critical to control infection-related disease progression. However, events during the acute infection stages may leave specific (epigenetic) signatures on this host immunity, which may impair future pathogen control. Such epigenetic dysregulation may also negatively impact on the effectiveness of therapeutic immune intervention; all reason why a better understanding of these mechanisms is urgently needed. For many years, we have characterized the host immunity in natural infection to different pathogens and have translated these insights into vaccine development. We have now also been able to integrate epigenomics into these analyses, to further refine future interventions and to identify novel therapeutic targets that can be leveraged to induce and/or restore effective antiviral immunity. We have also become increasingly interested in these immune regulatory molecular pathways in different patient populations, including individuals with different immunodeficiencies. Thus, our study populations include people with early HIV infection, controlled and uncontrolled HIV disease, as well as people with or without HIV infection that received solid organ transplants. Given that HIV and SARS-CoV-2 infection can lead to long lasting neurological complications, we have also set out to understand the epigenetic mechanisms involved in neurological manifestations of Long-Covid-19 and HIV-associated neurodegenerative disease. In our investigation, we also include individuals that have been diagnosed with virus driven cancers, such as EBV lymphoma (Epstein-Barr Virus) or HPV-derived cancers (Human Papillomavirus), as well as individuals of advanced age who often show a gradual decline of immune competence. Through close collaboration with ID physicians and neurologists, we have been able to deepen our analyses to include cells isolated from the CSF, which may be the mediators of some of the pro-inflammatory neurological disease spectra we observe. To track virus-specific T cell responses in these different compartments, we also analyze the T cell receptor repertoires mediating the cellular immune responses against the different viruses. With these analyses, we are steadily improving our understanding of the characteristics of an effective host immunity to these infections, and the epigenetic mechanisms that govern these responses long-term. These insights provide the basis for novel approaches for therapeutic interventions that we aim to develop and by which we aim to establish more functional and effective immunity in people at risk of uncontrolled chronic viral infections.

7 Conferences in which group members gave invited talks

10 Publications from the group

11 Ongoing projects

Research group leader
Christian Brander

Research associates
Àlex Olvera van der Stoep
Marta Ruiz Riol
Beatriz Mothe Pujadas

Predoctoral researchers
Iris Teubel
Igor Moraes Cardoso
Thuong Nguyen

Research scientist
Cristina Peligero Cruz

Senior laboratory technician
Samandhy Cedeño Briceño

Bioinformatician
Lluís Revilla Sancho

Laboratory technician
Tuixent Escribà Bel

Postdoctoral researcher
Sonia Villanueva Hernández

2024 milestones and perspectives for the future

During 2024, we have advanced our analyses of the AELIX-003 clinical trial which combined a therapeutic vaccine (HTI) and the TLR9 ligand Vesatolimod and have also completed the immune analyses for the BCN-03 clinical trial, which combined potent T- and B-cell vaccines in the therapeutic setting of HIV infection. Together with the AELIX-002 study, these clinical trials all show the critical contribution of HTI-specific T cell responses to virus control, which subsequently led to the acquisition of the HTI technology by Gilead Science. The analyses for the AELIX-002 study are still ongoing, including a multi-omics analysis that integrates transcriptomics, epigenetics, microbiota and plasma proteomics data. The transcriptomics data have been analyzed revealing gene expression profiles that are associated with the strength of the vaccine-specific immune responses as well as with virus control during the treatment interruption period. The data are currently being validated using in vitro models and data sets from other treatment-interruption studies. The further integration of omics data is conducted applying standard biostatistical methods, but also by using a novel artificial intelligence algorithm developed by a Barcelona-based AI partner.

We have also continued the immune monitoring of the participants in the BCN-03 trial. The BCN-03 trial is the first trial to combine potent T- and B-cell vaccines and produced first immune data early in 2024. While there was no significant difference in virus control during treatment interruption between the active and placebo study arms, the SOSIP-Env vaccination drove a further maturation of the B cell responses and was directly correlated to the magnitude of T cell responses induced by SOSIP vaccination.

Within the European Horizon 2020 EPIVINF project and the Caixa Health Epivirco study, we have advanced the analyses in Long Covid patients with neurological disease, conducting MRI and sampling the spinal fluid (CSF) to determine markers of neurological disease in this patient group. We successfully sampled cells from spinal fluid and have subjected these to transcriptomics and epigenetic analysis. These studies also reveal the TCR repertoire of SCF infiltrating cells, which we are now comparing to repertoires and antigen specificities in the peripheral blood.

Virus-Host Interactions (ViHIT)

PROJECTS AWARDED

Characterization of immune–tumor interplay in hormonosensitive, HER2 negative advanced breast cancer: towards the description of immune-derived biomarkers determining therapeutic efficacy
Funding: ISCIII
Participating entities: IrsiCaixa, ICO-IGTP
Starting and finishing date: 01/25-12/27
Principal investigator(s): Ester Ballana Guix, Mireia Margelí

Impact of tumor heterogeneity on resistance to (chemo) immunotherapy in head and neck squamous cell carcinoma. Relevance of the STAT3 pathway
Funding: ISCIII
Participating entities: IrsiCaixa, ICO-IGTP
Starting and finishing date: 01/25-12/27
Principal investigator(s): Eva Riveira Muñoz, Ricard Mesía

Impact of genital schistosomiasis on sexual and reproductive health in migrants from the metropolitan area of Barcelona
Funding: Ajuntament de Barcelona
Participating entities: IrsiCaixa, Fight Infections Foundation
Starting and finishing date: 01/25-12/26
Principal investigator(s): Edurne García Vidal

Desenvolupament d'un kit diagnòstic estàndard basat en PCR contra l'esquistosomiasi crónica
Funding: PERIS
Participating entities: IrsiCaixa
Starting and finishing date: 12/24-11/25
Principal investigator(s): Eva Riveira Muñoz

HERMION-3: impact of tumor heterogeneity on resistance to chemoimmunotherapy in head and neck squamous cell carcinoma. Relevance of the STAT3 pathway
Funding: Grupo español de tumores de cabeza y cuello (TTCC)
Participating entities: IrsiCaixa, ICO-IGTP
Starting and finishing date: 05/24-04/26
Principal investigator(s): Ester Ballana Guix, Beatriz Cirauqui

Unraveling chronic schistosomiasis: identifying metabolomic and inflammatory biomarkers to enhance diagnostics and understand pathological mechanisms for improved management of Long-term complications
Funding: Merck
Participating entities: IrsiCaixa, Fight Infections Foundation
Starting and finishing date: 01/26-12/26
Principal investigator(s): Eva Riveira Muñoz

AWARDS AND ACHIEVEMENTS

Sara Cabrero de las Heras and **Ester Ballana,** presented key results at the European Society of Medical Oncology (ESMO) congress.
Ester Ballana, co-organizer of the 4th meeting on Breast Cancer, together with B-ARGO and the Medical Oncology Department.
Sara Cabrero de las Heras and **Eudald Felip Falgàs**, presented their work at the San Antonio Breast Cancer Symposium (SABCS).
Maria Nevot Banús, granted with the R3 certificate.

Presentation

Our research focus is the study and characterization of innate immune system activation mediated by nucleic acid imbalances and its role in different human diseases, such as viral and non-viral infections, inflammatory diseases or cancer, with a view to developing new therapeutic strategies. Our group is currently working on two main research lines:

1. Identification and characterization of cellular factors in persistent infections We have been working in the characterization of virus-host interactions at different stages of virus replication, focusing especially on describing innate immune pathways and modulators that impact HIV-1 replication and respiratory infections as SARS-CoV2 and influenza. During this year, we have developed and standardized novel in vitro models of infection, including emergent viruses as ZKV, DNV and WNV and persistent viruses as HSV and HPV. In the field of HIV, we are specially interested in targeting latent HIV reservoirs, one of the main roadblocks for advancing towards an HIV-1 cure. Indeed, we have been focusing on the latency reactivation capacity of distinct innate immune modulators, identifying a subclass of selective JAK2 inhibitors as a potential novel therapeutic strategy for HIV-1 cure, through the modulation of IRF7. Overall, our data represent a promising step towards HIV eradication by demonstrating the potential of innate immune modulation for reducing the viral reservoir through a novel pathway driven by IRF7. Moreover, based on robust and versatile in vitro models capable of high-throughput testing of antiviral compounds, we have been able to identify a group of compounds that through the modulation of innate immune response exert potent antiviral activity against both acute and persistent infections, leading to the identification of novel immunomodulatory strategies with antiviral potential against herpesviruses, papillomaviruses and influenza viruses.
In addition, our group has also initiated the study of chronic schistosomiasis infection, an entity still poorly recognized a from which physiopathology, natural history and therapeutic approach is still poorly explored. Ongoing work in collaboration with Fundació Lluita contra les Infeccions includes the development and validation of novel tools for a better diagnosis and characterization of the diseases among migrants with clinical signs and symptoms compatible with chronic chistosomiasis.

2. Immune cell function in cancer: mechanisms, biomarkers and immunotherapeutic opportunities. Cancer immunotherapy—the science of mobilizing the immune system to kill cancer—has taken a center stage in oncology in the past few years, with unprecedented progress in clinical responses, rapid drug development, and first-in-kind approvals. However, despite the successful application of cancer immunotherapy across a broad range of human cancers, only a minority of patients

1 Group of talented researchers working together to improve current immunotherapies

6 New competitive projects awarded in 2024

8 Published peer-reviewed articles in high-impact journals

from specific subgroups of tumors experience life-long durable benefits and most of the patients do not respond or eventually relapse. In close collaboration with ICO-Badalona and B-ARGO research team, we work to contribute to a better understanding of breast cancer complexity in general, but specifically to the interactions between tumor and host immune cells, by using high-resolution transcriptomics and further investigation and validation of the underlying molecular mechanisms in in vitro immuno-organoid models.
Moreover, we have initiated a series of projects focused on head and neck cancer focused on the impact of tumor heterogeneity on resistance to (chemo) immunotherapy, an entity where STAT3 pathway is specially relevant. Our multidisciplinary research team brings together a group of healthcare professionals from different fields, including immunology, molecular biology, medical oncology, pathology, genomics and computer science, all focused on the generation of novel and disruptive knowledge on tumor-immune cell crosstalk and explore their translation into the clinical practice by looking for their applicability into novel treatments.

Research group leader
Ester Ballana Guix

Research associate
Eva Riveira Muñoz

Research scientists
Roger Badia Córcoles
Maria Nevot Banús

Postdoctoral researchers
Sara Cabrero de las Heras
Edurne García Vidal
Eudald Felip Falgàs

Predoctoral researcher
Ignasi Calba Iñiguez

2024 milestones

Our group achieved the following milestones:

— Development of novel and versatile in vitro tools for in depth characterization of immune function. We have developed and validated novel in vitro models for the in depth characterization of immune cell function across distinct disciplines, from non-clonal models of HIV persistence to 3D immuno-oncology culture models for breast and head and neck cancer research, among others.

— Advances in research into viral infections. We have expanded the number of tools and types of viruses readily available for the characterization of virus-host interplay. We currently have ready-to-use infection models for antiviral testing of Zika virus, Dengue, West Nile Virus, Influenza Virus, Herpes virus, and Papilloma virus.

— Identification and validation of prognostic and predictive immune-based biomarkers in cancer patients. In collaboration with Breast Cancer Unit of B-ARGO research team, we have characterized immune cell function in a cohort of breast cancer patients treated with CDK4/6 inhibitors. Since 2018, our group in collaboration with Dr. Miregia Margelí team has been recruiting patients with metastatic breast cancer diagnosis that were scheduled for starting treatment with CDK4/6 inhibitors, currently involving a cohort of 113 patients with available tumor biopsies and longitudinal blood samples. Initial characterization of the cohort, (funded by ISCIII-FIS, PI21/00642) resulted in the identification of important differences in expression of immune checkpoint molecules both in circulating CD4+ and CD8+ T lymphocytes, associated to disease progression. Similarly, the evaluation of plasma cytokine and inflammation markers also identified the existence of immune-mediated processes that determine CDK4/6 inhibitors efficacy, overall suggesting that immune cell dysfunction before treatment initiation is the main factor determining treatment failure. More importantly, evaluation of gene expression in tumor biopsies also identified enhanced expression of similar immune cell signatures in patients that do not response to therapy.

These results allowed us to propose a group of intrinsic immunologic characteristics that influence immune system capacity to respond to anticancer immunomodulatory agents.

Perspectives for the future

Our goal is to develop new and more effective therapeutic strategies to fight infections and cancer. Studies of host-pathogen interactions will continue, based on the inhibition of key interactions between viral and cellular targets, so as to establish mechanisms of action, determine the role played by cellular factors in different viral replication stages and evaluate new therapeutic targets.

Thanks to fruitful collaboration with B-ARGO, the identification and validation of prognostic and predictive biomarkers in patients with cancer will enter a new phase focused on in-depth study of breast and head and neck cancer cohorts by single cell transcriptomics and TCR sequencing. Moreover, we have started the development of immuno-organoids containing autologous tumor and immune cells from patients, with the aim to provide novel tools and expertise for the study of immune function in breast and head and neck cancer.

Retrovirology & Clinical Studies (GREC)

PROJECTS AWARDED

Clinical and biological characterization of non-suppressible viremia in people with HIV on antiretroviral treatment
Funding: MCIU-ISCIII
Participating entities: IrsiCaixa, Hospital Universitario La Paz-IdiPAZ, Hospital Universitario 12 de Octubre, Hospital Universitario Joan XXIII-IISPV
Starting and finishing date: 09/24-08/27
Principal investigators: Silvia Ribó Gené, Rocio Montejano Sánchez

Modulating viral post-transcription as a strategy to cure HIV (VIRNA)
Funding: MCIU-AEI
Participating entities: IrsiCaixa
Starting and finishing date: 09/24-08/27
Principal investigator: Sara Morón-López

Evaluation of the applicability of anti-CD4 CAR-T cells (CD4-CAR) to the elimination of the HIV-1 latent reservoir in people living with HIV (CARHIVapp)
Funding: MCIU-AEI
Participating entities: IrsiCaixa
Starting and finishing date: 09/24-08/27
Principal investigator: Maria Salgado Bernal

FPI fellowship
Funding: AGAUR
Participating entities: IrsiCaixa
Starting and finishing date: 01/24-12/27
Principal investigator: Eva Armendariz Burgoa

AWARDS AND ACHIEVEMENTS

Ángel Bayón Gil, awarded Summa cum laude for his PhD thesis entitled *Analysis of distinctive host immune factors in HIV+ Viremic Non-Progressors* (University of Barcelona).
Javier Martínez-Picado, 2024 Research and Investigation Award from the Association of Biologists of Catalonia
Javier Martínez-Picado, full member of the Royal. Academy of Science and Arts of Barcelona.
Javier Martínez-Picado, listed in the annual Stanford/ Elsevier Top Scientists Ranking.
Javier Martínez-Picado, awarded with R3 certification, evaluated by MCIU.
Maria Salgado Bernal, awarded with R3 certification, evaluated by MCIU.
Mª Carmen Puertas Castro, awarded with R3 certification, evaluated by MCIU.
Lidia Garrido Sanz, associated professor at the UAB.

Presentation

The current scientific interests of our group focus on characterizing the immuno-virological mechanisms of viral pathogenesis in human diseases, including HIV-1, Ebola virus, SARS-CoV-2, arenaviruses and syncytial respiratory virus. Our program has a translational character with the aim of investigating potential new viral therapeutic strategies through basic and applied research. We work closely with other IrsiCaixa research groups and with national and international biomedical institutes, focusing on five priority areas: HIV functional cure, HIV persistence, extreme cases of progression of HIV-1 infection, viral pathogenesis, and SARS-CoV-2/ COVID-19.

2024 milestones

1. HIV-1 functional cure. We previously described the first cases of HIV remission through an allogenic hematological stem cell transplant in people with HIV and hematological malignancies. In 2024 we reported the first case ever of HIV remission without using CCR5Δ32 donor cells. The team also assembled immunovirological data of more than 30 transplants within our international IciStem project unveiling that 'donor allogenic immunity' is a crucial mechanism to eliminate the viral reservoir, allowing for the cure of what was until recently considered an incurable disease. We reported 5 additional cases of HIV-1 remission in infants with intrauterine viral transmission, who received antiretroviral therapy at birth.

2. Viral persistence. Understanding viral persistence to tackle HIV cure strategies. Pioneering studies on people with extremely low virus reservoirs (LoViReTs) showed that the viral reservoir is up to 4 times smaller in those who started treatment after 2007 as a result of the high effectiveness of new treatments and the start of therapy immediately after diagnosis. We also reported that the size of the HIV reservoir and the functionality of the immune system, as measured in blood samples over a one-year period in individuals with HIV who initiated antiretroviral therapy containing dolutegravir, were similar regardless of whether a two- or three-drug combination regimen was used.

3. Extreme cases of progression of HIV-1 infection. We have identified the immunovirological features and mechanisms of protection in a group of people with HIV, known as 'viremic non-progressors', who maintain stable their immunity despite showing a sustained viral replication in their blood. We have also compiled information of international cases of 'exceptional elite controllers', who do not show virus for many years despite no receiving antiretroviral therapy. These profiles may contribute to the understanding of the pathogenesis of the infection and may assist more personalized medicine strategies.

5. Viral pathogenesis. Our previous seminal work on the identification of the recognition axis between viral gangliosides and their receptor CD169/ Siglec-1, led to the development of new monoclonal blocking antibodies against CD169. Now, these antibodies have been fully humanized, chemically optimized, and tested in the context of HIV-1, Ebola virus, and SARS-CoV-2.

12 Ongoing research projects

12 Peer-reviewed scientific publications

+30 Presentations in scientific conferences and workshops

Research group leader
Javier Martínez-Picado

Research associates
Jakub Chojnacki
Sara Morón López
Mª Carmen Puertas Castro
Patricia Resa Infante
Maria Salgado Bernal

Research scientist
Silvia Ribó Gené

Predoc researchers
Eva Armendariz Burgoa
Ángel Bayón Gil
Gerard Campos Gonzalez
Irene González Navarro
Jon Izquierdo Pujol
Fernando Laguía Nueda

Statician
Víctor Urrea Gales

Bioinformatics postdoctoral researcher
Lidia Garrido Sanz

Senior laboratory technicians
Patricia Piñol Jurado
Mª Carmen García Guerrero

5. SARS-CoV-2 and COVID-19. We collaborated to the characterization of the proteomic profile of circulating extracellular vesicles revealing diverse clinical presentations of COVID-19. Moreover, the study did not identify viral peptides suggesting that extracellular vesicles and SARS-CoV-2 utilize independent biosynthetic secretory pathways to exit infected cells. We also contribute to the testing of protein nanoparticles that bind with high affinity to SARS-CoV-2 blocking its entrance into human cells. These nanostructures were engineered and packed into columns to build up trapping devices for viral adsorption.

Perspectives for the future

— Advancing the IciStem project on Hematological Stem Cell Transplantation, including multiomic comparisons of remission and non-remission cases, new immunological interventions, and expanded recruitment.
— Investigating mechanisms to reverse HIV-induced immune dysfunction in people on stable antiretroviral therapy with low-level reservoirs, focusing on viral diversity, innate immunity, single-cell transcriptomics, and epigenomics.
— Identifying and validating immune interventions to shrink the HIV reservoir, including cell/gene therapies and checkpoint inhibitors.
— Characterizing persistent HIV-1 antigen production in treated individuals and its role in inflammation and immune activation.
— Developing preclinical approaches to eliminate the latent HIV-1 reservoir using anti-CD4 CAR T cells and HIV-1 RNA biogenesis inhibitors targeting RRE-Rev.
— Exploring viral splicing modulation as an HIV cure strategy.
— Studying CD169-mediated endocytosis in myeloid cells and its role in virus spread.
— Designing CD169-targeted nanocarriers for drug and immunogen delivery and nanodevices to capture viruses and extracellular vesicles.
— Developing mass PCR testing for pandemics, focusing on technology, implementation, epidemiology, and socio-economic impact.
— Investigating genetic and immunological factors behind SARS-CoV-2 clinical manifestations for personalized medicine.
— Evaluating brain organoids' predictive value in SARS-CoV-2-induced neurodegeneration.
— Unraveling the biological mechanisms of long COVID in children.

Cell Virology & Immunology (VIC)

PROJECTS AWARDED

Validació de partícules similivíriques com a plataforma vacunal contra el càncer de pàncrees
Funding: PERIS
Participating entities: IrsiCaixa
Starting and finishing date: 12/24-12/26
Principal investigator(s): Carmen Aguilar Gurrieri

Revolutionizing pancreatic cancer therapy: validating virus-like particles (VLPs) for neoantigen-based vaccination
Funding: Agència de Gestió d'Ajuts Universitaris i de Recerca
Participating entities: IrsiCaixa
Starting and finishing date: 12/24-06/26
Principal investigator(s): Carmen Aguilar Gurrieri

AWARDS AND ACHIEVEMENTS

Edwards Pradenas Saavedra, awarded the 'Premi Extraordinari de Doctorat de la UB'.
Carmen Aguilar Gurrieri, received an award at the INNOMED Awards, held at the Campus Can Ruti.

Presentation

Accumulated experience in immune responses to infectious diseases has enabled the group to focus on new vaccines and therapeutic antibodies against viruses such as HIV and SARS-CoV-2.

The work on SARS-CoV-2, led by Dr. Benjamin Trinité, involves the analysis of neutralizing immune responses (using our pseudovirus neutralization technology) that allows us to characterize immune escape of of new SARS-CoV-2 variants in collaboration with academic and industrials collaborators (ISGlobal, HSJD, HIPRA, among other). This work is complemented with the analysis of inflammatory responses and the development of synthetic neutralizing antibodies.

The relevance of neutralization assays to understand immune responses to viruses has led Dr. Francesc Cunyat to start new projects with the aim to expand our capacity to evelauate neutralizing responses to other viruses. Therefore, besides HIV and SARS-CoV-2, new neutralization assays for RSV and WNV are being developed.

Our work on HIV vaccines and treatments, is based on a novel highly immunogenic VLP platform. A new grant from the "Instituto de Salud Carlos III" will allow us to maintain this activity and in particular to analyze the immune responses in Exceptional Elite Controllers, individuals infected by HIV that are able to control the virus for more than 25 years, and are therefore a closest natural case to HIV cure. Understanding the role of antibodies in this exceptional control of the virus, will help to design new vaccines.

Regarding cancer vaccine research (in collaboration with the NeoVaCan group at IrsiCaixa), the work of the latest years has seen its first outcomes with the demonstration of efficacy in animal models and the optimization of the vaccine platform in a work led by Dr. Carmen Aguilar.

2024 milestones

1. Identification of a broadly neutralizing anti SARS-CoV-2 antibody (10.1038/s41467-024-45171-9), and new antibodies in development.

2. Collaboration agreement between IrsiCaixa and Hospital Sant Joan de Déu to start projects on inflammatory and infectious pediatric diseases.

3. First competitive projects granted to Carmen Aguilar to develop neaontigen-based cancer vaccines.

Perspectives for the future

Our work on SARS-CoV-2 will maintain the focus on new viral variants and the development of broadly neutralizing antibodies (a new patent is expected to be filed in Febreuary 2025). The characterization of inflammatory responses in children (MIS-C) in collaboration with Hospital Sant Joan de Deu will be also a relevant activity.

2 New projects awarded

12 Scientific articles published, mostly on SARS-CoV-2

15 Committed researchers working on infectious diseases and immunology

Research group leader
Julià Blanco Arbués

Research associates
Carmen Aguilar Gurrieri
Francesc Cunyat Viaplana
Benjamin Trinité

Postdoctoral researcher
Edwards Pradenas Saavedra

Predoc researchers
Ferran Abancó i Espuga
Júlia Albó Delgado
Tetyana Pidkova
Anna Pineda Micola
Anna Pons Grifols

Statician
Victor Urrea Gales

Senior laboratory technicians
Ester Aparicio Prats
Amaya Blanco Perera

Laboratory technicians
Silvia Marfil Verchili
Carla Rovirosa Martí

The development of new neutralization assays will also be a major activity, with the priority of raising funds from public calls. A new collaboration with Hospital Sant Joan de Deu on RSV immune responses in children is expected to start in 2025.

The work on HIV will focus on The exceptional Elite Controller Cohort. We have generated a large collection of HIV envelope genes from these patients and collected longitudinal plasma samples from them. The characterization of autologous neutralizing activity of antibodies and the viral evolution will be key pieces of information to understand tthe immune control and to inform vaccine design.

Cancer vaccine development will be boosted in 2025 with two new grants and the incorporation of a new PhD student in 2024. A patent is expected to be filled in 2025 describing the definitive vaccine platform. Translation to clinical grounds by analyzing the regulatory pathway will be a priority.

Tissue Virology (VITI)

PROJECTS AWARDED

Validation of a urine proteomic signature to predict complete pathologic response in patients with muscle-invasive bladder cancer treated with neoadjuvant treatment
Funding: GILEAD
Participating entities: IGTP, ICO
Starting and finishing date: 01/25-12/26
Principal investigator(s): Cecilia Cabrera Navarro, Albert Font

RUTI: Priming the Immune System for Bladder Cancer Treatment
Participating entities: IrsiCaixa
Starting and finishing date: 01/25-12/25
Principal investigator(s): Cecilia Cabrera Navarro

Presentation

The study of the impact of HIV on immune cells present in tissues, particularly in mucosa-associated lymphoid tissue became the hallmark of the research group. However, in recent years, the evaluation of the immune response present in tissues has emerged as a critical field in the study of several pathologies including infectious diseases and cancer. In this scenario, the research group has broadened its objectives by applying the knowledge acquired and the tools and biomodels developed, and has established a line of research focused on the characterization of tissue-specific immunopathogenesis. The group has been working in three different settings (infectious diseases, bladder cancer and lung pathologies).

— **Evaluation of viral associated immunopathogenesis:** HIV infection is a mucosa-associated disease, with pathogenesis in two phases: an acute phase, associated with a massive loss of CD4+ T-cells resident in the mucosa, especially in the gut-associated lymphoid tissue (GALT), and a chronic phase, responsible for the gradual destruction of CD4+ T-cells in peripheral blood and characterized by elevated immunological activation and elevated production of proinflammatory cytokines. Cellular immune response in HIV infection is not capable of controlling viral replication in most individuals, probably because the quality and place of induction may not be suitable. During this year the group has been working in the evaluation of the mechanisms of HIV associated cell death and in the characterization of new strategies to improve the antiviral response of the cells present in the tissues. In ex vivo tissue cultures we have characterized the tissue resident immune cells functionality and described a new immunomodulator capable of increase their functionality by the modulation of the innate immune response.

4 Ongoing projects

1 European research project awarded to the group

1 Group of committed people fighting human diseases

— **Immunopathogenesis in bladder cancer:** bladder cancer is one of the most prevalent cancers in the world. Around 70%–80% of de novo bladder cancers are diagnosed in early stages with no muscular invasion (NMIBC). These patients are often managed with transurethral resection of bladder tumor (TURBT) with or without adjuvant intravesical therapy. The standard treatment in these patients is intravesical administration of BCG (Mycobacterium bovis mycobacterium). Although the mechanism of action is not fully understood, it is thought that the immune system is activated and immune cells are attracted to the bladder wall. While BCG is effective in preventing the development of new tumours, many patients fail to respond and no alternative is as yet available. Therefore, new strategies that improve the clinical management of patients are urgently needed. Using an animal model, we have been working in the evaluation of bladder tumor immune microenvironment profile after BCG intravesical treatment. In addition, we are currently working in the evaluation of the role of the immune system in invasive muscle bladder cancer (MIBC) and its impact on the efficacy of

neoadjuvant chemotherapy (NAC).
— Development of new pre-clinical clinically relevant models for the evaluation of tissue-specific immunopathogenesis: our group is interested in the development of new 3D models for the evaluation of the pathogenesis associated with different pathologies. In this regard, we are working on the establishment of different cell culture models to study lung health and tumor tissue associated immunology.

2024 milestones

— Mechanisms of HIV associated cell death. We have shown that autophagy is playing a key role in HIV pathogenesis, therefore, targeting the autophagic pathway could be a new therapeutic approach to be explored to treat HIV-1 infection.

— Identification of novel immunomodulator. In ex vivo tissue cultures we have characterized the tissue resident immune cells functionality and described a new immunomodulator capable of increase their functionality by the modulation of the innate immune response.

— Characterization of the bladder immune microenvironment and evaluation of new therapeutic strategies. We have demonstrated that that each mycobacterium requires specific culture conditions to induce an effective antitumor response. The cell-surface lipidomic profile could be modified and these profiles impact the triggered immune response, both local and systemic. We have also demonstrated that the bladder immune microenvironment induced by mycobacterial treatment is species specific and shaped by mycobacterial cell envelope composition. Therefore, the global bladder immune microenvironment can be remodelled, improving the quality of infiltrating immune cells, the balance between inflammatory and regulatory/ suppressive responses and increasing survival.

— Evaluation of the impact of indoor air quality in human health. We have initiated the establishment of new pulmonary study models. This has allowed us to have financing from European funds to evaluate the impact of the indoor air in the human lung (TwinAir Project).

Research group leader
Cecilia Cabrera Navarro

Research scientist
Jordi Senserrich Velasco

Predoctoral researcher
Joan Pagès Oliveras

Laboratory technician
Elisabet García Rodríguez

Perspectives for the future

— To increase the knowledge that the immune system is playing in the pathogenesis of bladder cancer and to design new and more effective therapeutic strategies to fight cancer or even other diseases in which the immune system needs to be modulated, such as infectious diseases.

— Consolidation of the research group and improve competitive funding in the cancer field will be one of our main objectives for 2024.
— To establish new clinically relevant models that recapitulate the complexity of the human diseases and may be used in personalized medicine approaches.

Immunology (IGG)

PROJECTS AWARDED

MoVIHvax: Immune responses after MVA-BN vaccination in people with and without HIV
Funding: Babarian Nordic
Participating entities: IrsiCaixa, Fight Infections Foundation
Starting and finishing date: 05/24-05/26
Principal investigator(s): Beatriz Mothe

BREAKFREE-Sy: Unchaining diagnostic and therapeutic tools for syphilis in pregnancy, neurosyphilis and treatment failure
Funding: Horizon EU
Participating entities: IrsiCaixa, Fight Infections Foundation, University of Washington, Guangzhou Dermatology Hospital
Starting and finishing date: 04/25-04/30
Principal investigator(s): Jorge Carrillo, Oriol Mitjà, Lorenzo Giacani, Wujian

AWARDS AND ACHIEVEMENTS

Marisa Rodríguez de la Concepción, awarded for an oral communication at the HIVR4P meeting in Lima, Perú.

Presentation

The **IrsiCaixa**'s Immunology group was created in May 2020 under the supervision of Dr. Carrillo. Our mission is to improve the human immune system's response to pathogens to prevent infectious diseases, particularly those caused by HIV-1, SARS-CoV-2, Treponema pallidum, and West Nile Virus. Additionally, our research interests extend to immuno-oncology, basic immunology, and autoimmunity, with immunology serving as the central focus of our work. The Immunology group at **IrsiCaixa** collaborates with numerous research teams, both within and outside of **IrsiCaixa**.

2024 milestones

SARS-CoV-2/COVID-19
We have investigated the role of the humoral immune response in the development of severe COVID-19 cases. In this study (currently under submission), we established that severe COVID-19 cases exhibited higher titers of anti-SARS-CoV-2 IgG and IgA compared to individuals with mild disease. However, no significant functional differences were observed between the two groups. Interestingly, the analysis of humoral response avidity revealed that early anti-RBD IgG and IgA may originate from extrafollicular B cell activation pathways.

HIV/AIDS
Our work on characterizing HIV-neutralizing interfering antibodies (NiAbs) was presented as an oral presentation at the HIVR4P meeting held in Lima from October 6th to October 10th. We are continuing our efforts in HIV vaccine development and have successfully produced several novel HIV envelope immunogens in the lab.

***T pallidum*/Syphilis**
Our work on syphilis vaccine development is ongoing. We have expressed several Treponema pallidum antigens in the lab, and immunogenicity studies are planned for 2025. Dr. Oriol Mitjà (Fight Infections Foundation), one of our key collaborators on this project, was awarded an ERC Consolidator Grant, in which we are participating as a partner. Our role in this project focuses on the development of a syphilis vaccine and antibodies, along with the isolation of clinically relevant *T pallidum* specimens.

West Nile Virus/West Nile Fever
Dr. Carrillo coordinate the European project LWNVIVAT, which focus on the development of a WNV prophylactic vaccine as well as antibodies that can be used for preventive and therapeutic purposes. The project is progressing well, and several WNV immunogens have been produced and purified in the lab.

Perspectives for the future

We aim to further consolidate our research efforts and strengthen both national and international collaborations. Our priority will be to expedite the development of HIV, WNV, and syphilis vaccines. Finally, we expect to complete our study on the role of NiAbs in HIV-1 infection.

8 **Publications in top scientific journals**

5 **Invited talks**

Research group leader
Jorge Carrillo Molina

Research scientist
Erola Ainsua Enrich

Postdoctoral researcher
Núria Pedreño López

Predoctoral researchers
Carlos Ávila Nieto
Marina Matilla Martínez

Senior laboratory technician
Marisa Rodríguez de la Concepción

Translational Research in Immunology and Ageing (TRIA)

PROJECTS AWARDED

Monocytes imprints as predictors of cardiovascular risk in PLWH (CardioMetabol)
Funding: Acadèmia de les Ciències Mèdiques i les Balears
Participating entities: IrsiCaixa, HUMT
Starting and finishing date: 01/24-12/25
Principal investigator(s): Marta Massanella Luna

Biomarkers to predict Cardiovascular disease in PWH: a longitudinal 14-years of follow up study (PREDvihCT-COR)
Funding: ISCIII
Participating entities: IrsiCaixa, HUMT
Starting and finishing date: 01/25-12/27
Principal investigator(s): Àngels Jaén Manzanerea

AWARDS AND ACHIEVEMENTS

Marina Martinez Velasco, awarded with the Pumerola fellowship from SCMIMC.
Macedonia Trigueros Peña, awarded with a fellowship to present her results on accelarated immunoageing in PWH on ART at AIDS 2024 in Germany.
Francisco Muñoz Lopez, selected to present his results on Long COVID at the Demystifying Long COVID international meeting 2024, in Barcelona.
Marta Massanella Luna, invited to EATRIS-BY-COVID workshop to discuss Long COVID collaborations.
Marta Massanella Luna, professor at the Comprehensive Management for Active and Healthy Aging in HIV - Centre of Excellence, supported by Gilead.

Presentation

TRIA focuses on translational studies to investigate the remodeling of the immune system after viral infections and during the process of ageing, focusing on three main lines of research: inflammageing and immunosenescence during HIV infection, COVID-19 vaccine response in older adults and studies on Long-Covid.

— **Inflammageing and immunosenescence during HIV infection.** Despite the great improvement brought by ART, the prevalence of age-related comorbidities is higher in people with HIV (PWH). We study this accentuated ageing and characterize immune dysfunction, HIV reservoir and altered metabolism in PWH on ART. PWH have a higher prevalence of cardiovascular events than the general population, associated with persistent systemic inflammation, which has also been associated with epigenetic and metabolic changes in monocytes. In addition and in collaboration with Mutua de Terrassa, we put special interest in the role of monocytes in the development of cardiovascular diseases in PWH.

— **COVID-19 vaccine response in older adults.** We are working in close collaboration with the Metropolitana Nord Primary Care Centre (DAP-MN) to evaluate the immune response generated by COVID-19 vaccines in previously infected and uninfected older adults living in long-term care facilities as well as noninstitutionalized older individuals, to adapt the SARS-CoV-2 booster vaccination calendar to their specific immune needs.

— **Studies on Post-COVID-19 condition.** In addition, our group has contributed to the establishment of the referral national clinical unit of post-COVID-19 condition at Germans Trias i Pujol Hospital, where patients who experience heterogeneous and debilitating persistent symptoms for months after SARS-CoV-2 infection are followed. In this unit, clinical care management is completely linked to longitudinal research studies to assure the well-being of the patient as well to determine the origin(s) of the persistent symptomatology. In our group, we are characterizing the immune dysfunctions behind Long-Covid, to find diagnostic markers and identify treatment interventions that could lead to the recovery of these patients. Furthermore, we are collaborating with IDIAP Jordi Gol to investigate the neurological impairments of Long COVID, broadening our understanding of the condition and exploring innovative approaches to its clinical management. Finally, we are participating in several clinical interventions to treat this condition.

2024 milestones

HIV studies
— **Accelarated immunoageing in younger PWH on ART**. In a cross-sectional study, we evalauted the effects of HIV infection and age on immunological markers in PWH on ART. Our results support that HIV infection was linked to increased inflammation and activation markers, while age primarily affects immunosenescence, specifically in CD8 T cells. Elevated biomarker levels in younger PWH on ART suggest accelerated immunological aging, contributing to earlier comorbidities. Early interventions targeting inflammation in young PWH on ART could help mitigate long-term comorbidities. (Loste C, Trigueros M et al, Int J Mol Sci 2024 and Trigueros et al, Gesida 2024).

— **Unraveling Immunosenescence and Immunometabolism in HIV Infection**. We are continuing our efforts to identify distinct patterns of immunosenescence and immunometabolism in T cells across different age groups in PWH compared to uninfected controls, aiming to distinguish changes driven by HIV infection from those associated with natural aging. Additionally, we are further exploring how the metabolic status of CD4 T cells influences HIV reactivation and the persistence of infected cells. (MetabolHIV project funded by MICINN; PID2020-114929RA-I00).
— **Cardiovascular risk in PWH on ART**. In collaboration with Dr David Dalmau (Mutua de

8 Peer-reviewed publications

20 Ongoing projects of HIV and SARS-CoV-2

2 Clinical trials on Long Covid

Terrassa), we are advancing our research to identify predictive biomarkers of cardiovascular risk in PWH on ART. We are evaluating evaluating inflammatory status, T-cell subpopulations, monocyte activation, and metabolic profiles within a longitudinal cohort of PWH on ART (HUMT cohort, N=250) followed for 15 years with comprehensive cardiovascular assessments. These findings will be compared to an HIV-negative population (REGICOR cohort). This project is supported by funding from the Acadèmia de Ciències Mèdiques de Catalunya i Balears (Projecte de Recerca Bàsica) and ISCIII-FIS-PI24/02029.

— **Impact of Viral Tropism on HIV Reservoir Seeding & Inducibility**. In collaboration with Dr MC Puertas (GREC), we are pursuing the characterization of the viral reservoir in late-presenter PWH on ART who exhibit evolution to X4-tropism (N=20), compared to those harboring only R5-tropic proviruses (N=20). We have assessed the differential rate of productive reactivation in naïve versus memory CD4+ T cells and will continue to explore the genetic landscape of the reservoir, as well as evaluate the response to Latency Reactivation Agents in both subsets. These ongoing studies will help anticipate the potential response of individuals with dual or X4-tropism to future LRA treatments.

COVID-19 studies

— **Coordination of the KING cohort extension of SARS-CoV-2 infected individuals** (N>1000) with different levels of severity (asymptomatic to critical), a cohort that is of use to all **IrsiCaixa** groups. This cohort includes also more than 650 individuals suffering from Long COVID.

— **Characterization of Long COVID**. We are exploring various hypotheses regarding the origin of Long-Covid, including immune dysregulation, endothelial abnormalities, viral remnants, autoimmunity, dysfunctional neurological signaling, and mitochondrial dysfunction. Our investigation focuses on the pro-inflammatory status, immune dysfunctions, and the persistence and reactivation of viruses in individuals with Long-Covid, assessing their association with specific persistent symptoms. These studies aim to uncover the mechanisms driving Long-Covid to identify potential therapeutic targets for this condition. (Funded by Becas Gilead, GLD21-00070, MICINN, PID2021-124226OB-I00, CIBERINFEC IM22/INF/5).

— **Characterization of Neuro Long COVID**. Despite neurocognitive symptoms being frequent (>65%) and disabling in Long COVID, the underlying mechanisms are unclear. Potential contributing factors include viral invasion, neuroinflammation, vascular changes, and metabolic disturbances. Our studies aim to identify biomarkers and altered pathways in individuals with neurocognitive and neuropsychiatric symptoms, to explore potential therapeutic strategies (funded by PERIS-AP, SLT021/21/000055, EPIVINF and EPIVIRCO projects, funded by HORIZON-HLTH-2021-DISEASE-04, NEUROLongCOVID, Marató 202120-30).

— **Characterizing COVID-19 Vaccine-Induced Immune Responses in Older Adults**. In collaboration with Drs Nuria Prat (DAP-MN) and Concepció Violán (IDIAP-Jordi Gol), coordination of the CoronAVI@S and IMMERSION studies of residents of long-term care facilities or non-institutionalized older adults to evaluate the quality and duration of immune responses elicited by SARS-CoV-2 vaccine (Funded by Gloria Soler, PERIS AP).

— **Characterization of SARS-CoV-2 Reinfections**. We have further explored clinical outcomes of SARS-CoV-2 reinfections, identifying genetic variability and variant exchange as key causes. Individuals in poor health are more vulnerable, and while vaccines reduce severity, their protection lasts only two months. We recommend adjusting vaccination schedules to match variant changes and prioritizing those with compromised health (Funded by Marató TV3).

Research group leader
Marta Massanella Luna

Research scientist
Ana Gervassi León

Senior laboratory technician
Gooya Banaei

Predoctoral researchers
Marissa Flores Santamaria
Marina Martínez Velasco
Francisco Manuel Muñoz López
Macedonia Trigueros Peña

Perspectives for the future

Ageing with HIV

We will continue studying accelerated immunoageing and immunosenescence in PWH on ART compared to uninfected individuals. Our goal is to uncover the origins of immune dysfunction and develop senolytic and metabolic interventions to reduce long-term comorbidities linked to HIV and ageing. We will also examine how natural ageing affects the viral reservoir, considering age, ART status, and treatment timing. Additionally, we will explore cellular metabolism's role in cardiovascular disease to identify therapeutic targets that lower cardiovascular risk and improve the health of PWH on ART.

COVID-19

Our research on SARS-CoV-2 will focus on Long COVID, using patient data to test pilot interventions that alleviate symptoms and enhance recovery. We will also assess immune responses in older adults in long-term care facilities to refine their vaccination schedule and ensure protection.

Pathogen Immunity, Signalling & Therapeutic Applications (PISTA)

PROJECTS AWARDED

Evaluation of the antiviral activity of Aplidin in a new panel of RNA viruses
Funding: PharmaMar
Participating entities: IrsiCaixa, PharmaMar
Starting and finishing date: 11/24-11/27
Principal investigator(s): Nuria Izquierdo-Useros

Novel antiviral and immunomodulatory broad-spectrum therapies targeting cellular host factors (ViroSTOP)
Funding: MICIU
Participating entities: IrsiCaixa
Starting and finishing date: 09/24-08/27
Principal investigator: Nuria Izquierdo-Useros

Juan de la Cierva fellowship
Funding: MICINN
Participating entities: IrsiCaixa
Starting and finishing date: 01/25-12/26
Principal investigator: Eloi Franco Trepat

FPI fellowship
Funding: MICINN
Participating entities: IrsiCaixa
Starting and finishing date: 02/25-02/29
Principal investigator: Irene Silva Ruiz

AWARDS AND ACHIEVEMENTS

Eloi Franco Trepat, granted a Juan de la Cierva postdoctoral grant.
Elisa Molina Molina, stays in the renowned laboratory of Dr. Jeffrey Chao, specialized in the regulation of gene expression, at the Friedrich Miescher Institute for Biomedical research, Basel, Switzerland.
PISTA group, profiled in Lancet Infectious Diseases.
PISTA group, part of the scientific organizing committee of the 17th International Symposium on Dendritic Cells, all the academic activities of the Catalan Society of Immunology, the Virology Conference of the Catalan Society of Biology, and the Woman for Equity in Science conference in Can Ruti.

Presentation

We are an emergent pathogens research group interested in finding novel therapeutic solutions while understanding the molecular basis of infectious diseases. PISTA studies pathogen immunity, signaling and therapeutic applications.

In a constantly evolving world where climate warming and globalization trends are changing the geographical distribution of infectious diseases, our goal is to combat emerging viruses designing novel therapeutic tools. PISTA was launched in February 2020 and immediately devoted all efforts to tackle SARS-CoV-2 pandemic. Many of the techniques implemented have helped us fighting other viral threats, including mpox (MPXV), the respiratory syncytial virus (RSV) and the West Nile virus (WNV). The main 3 axis of our team are:

1. Identify and develop effective antivirals.
2. Find and potentiate efficacy of immunomodulators.
3. Provide reliable tools to test and validate novel vaccines.

Our group collaborates with academic partners, clinical researchers and different industries to bring up together innovative antiviral strategies and novel solutions to counteract microbial threats.

2024 milestones

We actively work to crystallize novel therapies, immunomodulators and vaccines against viruses such as SARS-CoV-2, MPXV, RSV and WNV that urgently need effective antiviral strategies in place. We aim to implement new tools that could avoid emergent virus transmission and are currently working to translate all the gained knowledge to tackle new viral threats by developing novel broad spectrum therapeutic approaches. During this year, our work has been devoted to the following activities:

1. Study the molecular fingerprint of compounds with antiviral or immunomodulatory potential to anticipate novel indications. Beyond the well-known mechanism of action of drugs and therapeutics, all molecules exert additional biological effects that offer a window of opportunity to define novel therapeutic targets. Our team has developed a systematic approach to define the molecular fingerprint of compounds focusing on orthogonal methodologies that combine proteomics, molecular integrative analyses, and functional validation assays. By these means we can forecast previously unknown functions and predict novel applications in the immunomodulatory and antiviral fields. Using these analyses, we have predicted and confirmed in vitro that the oncologic compound from PharmaMar plitidepsin can inhibit other unrelated viruses aside from SARS-CoV-2, such as members from the Flaviviridae, Pneumoviridae and Herpesviridae families. By unraveling the molecular landscape shaped by host targeted therapies such as plitidepsin we identified a novel broad-spectrum antiviral with potential to counteract future pandemic viruses.

2. Develop innovative therapies as broad-spectrum antivirals & immunomodulators. In collaboration with the team led by Dr. O'Keefe of the NCI (Frederick, USA) and researchers from Brazil and Barcelona, our

1 **Reason to work together as a team: fight emergent viruses**

2 **Outstanding researchers join the PISTA group**

9 **Accepted peer-reviewed publications**

team has contributed to the identification of new type of Cyanovirin with broad antiviral activity that prevents infection of a wide range of SARS-CoV-2 variants along HIV-1, continuing with the studies published last year (Muñoz-Basagoiti et al. PNAS, 2023). Along with the team of Dr. Gracia-Sastre (Mount Sinai, USA) and partners from Switzerland and Madrid we have evaluated the effect of plitidepsin in IL-6 secretion in different in vitro and in vivo experimental models, given that this cytokine is one of the main drivers of acute respiratory distress syndrome. Thanks to this international collaborative initiative, we showed that plitidepsin has immunomodulatory effects against different viruses, that are evidenced both in vitro and in vivo by a decrease of pro-inflammatory cytokines (Losada et al. J. Immunol, 2024). This is one of the rationales that sustains the clinical trial launched by FSL where plitidepsin will be tested to treat the Long Covid condition. We are also collaborating with the company Amassence to unravel the antiviral potential of compounds derived from plants grown in preserved nature reserves of the Amazon's rainforest.

Research group leader
Nuria Izquierdo Useros

Research associate
Dàlia Raïch Regué

Predoctoral researcher
Elisa Molina Molina

Research scientist
Sandra Franco Cirera

Senior laboratory technicians
Rytis Boreika
Itziar Erkizia Jauregi

Postdoctoral researcher
Eloi Franco Trepat

3. Advance effective tools for the study of re-emergent viruses. We have continued studies with replication competent MPXV. These assays have been critical to characterize immune responses associated with MPXV clearance in a prospective observational cohort of people living with and without HIV in Spain established by Drs. Mothe and Mitjà at HUGTIP (Morales-Cardoso et al., Lancet Microbe, 2024). In addition, in collaboration with the group of Dr. Meyerhans we have characterized immunity against MPXV of individuals vaccinated with an attenuated smallpox vaccine (Sisteré-Oró et al. 2024). We have actively improved our antiviral screenings for emerging viruses such as MPXV, RSV and WNV in more physiological settings, including myeloid cells and organoids such as the ones developed by IRTA-CReSA within the frame of the project FarmBank, in which we actively participate.

4. Viral neutralization assays for the regulatory approval of vaccines. We have set up a viral neutralization assay with replication competent WNV that will be critical to validate the candidate vaccines that are being developed within the LWNVIVAT European Project led by Dr. Carrillo. We have also performed several neutralization assays for RSV in the context of a project from CDTI Misiones led by HIPRA, IQS and Curapath for the development of a novel vaccine for RSV in collaboration with Hospital Clínic. We continue our efforts to provide viral neutralization assays to test the efficacy and immunogenicity of novel adapted vaccines developed by HIPRA, such as the recent Omicron XBB.1.16 adapted vaccine (López-Fernandez et al, Vaccine, 2024). In addition, we have actively participated in the RBDCOV EU funded project led by HIPRA by testing the viral neutralization assay activity in people living with HIV-1. We have also expanded our bank of SARS-CoV-2 primary isolates, which are sequenced and available for the research community, including different groups of **IrsiCaixa** (De Campos-Mata et al., Nat Comm, 2024; Ávila-Nieto et al., Nat Comm, 2024).

5. Identify antivirals inhibiting human endogenous retroviruses (HERVs) while exploring their implication in neurodegenerative diseases. We have set up several independent preclinical models based on functional in silico and in vitro assays to perform high throughput screenings to identify novel compounds with potential to interfere with distinct human endogenous retroviruses (HERVs). These include LINE-1, whose retrotranscriptase activation is associated with Alzheimer disease and senescence. This pipeline is run along Nostrum Biodiscovery, based at the Barcelona Supercomputer Center, and aims to select candidates with ground-breaking potential to treat early neurological diseases and prevent neurodegeneration. Our final goal is to select the best candidates that will be tested in key animal models by the team of Dr. Mara Dierssen at CRG. We have also started to analyze the expression of LINE-1 and several type I interferon genes expressed on cells of patients diagnosed with mild cognitive impairment (MCI) that participate in the clinical trial recently launched by FSL (NCT06519357). This single-center, self-controlled, prospective case series pilot study aims to assess the ability of lamivudine to reduce the levels of neurocognitive impairment biomarkers in the plasma of patients with MCI and positive Alzheimer disease biomarkers by inhibiting LINE-1 and HERV activation.

Perspectives for the future

We pursue translational impacts of our research, focusing on:

— The discovery of mechanisms of action of antivirals and immunomodulators to foresee their clinical potential and anticipate side effects.
— The validation of methodologies that can facilitate vaccine approvals.
— Contributing to the design of clinical trials aimed at improving the quality of life of participants.
— The application of all the gained knowledge by the team to limit respiratory viruses and emergent viral threats.

Neoantigens and Vaccines against Cancer (NeoVaCan)

PROJECTS AWARDED

Innovative mRNA vaccine against NSCLC: designing a platform of targeted polymeric nanoparticles for efficient personalized therapy
Funding: IGTP/IOR
Participating entities: IrsiCaixa, IGTP, IOR
Starting and finishing date: 01/24-12/25
Principal investigator(s): Núria de la Iglesia Zaragoza

Presentation

The NeoVaCan group performs immunogenomic analyses of solid tumours and liquid biopsies to study the interplay between tumor cells and the immune microenvironment. We are using multi-omics coupled to functional immune cell-based assays to get a deeper understanding of the host immune response against cancer and identify mechanisms of immune escape, ultimately taking cancer patient therapy towards personalization.

Our research has two main pillars:

1. Study of the immunobiology of specific tumor types, such as pancreatic cancer, to understand the roots of immune failure to control tumor development.
2. Identification and characterization of neoantigens to be used as targets for immunotherapies, with a special focus on neoantigen vaccines.

Together with the Cell Virology and Immunology (VIC) group at **IrsiCaixa**, we are co-developing preventive and therapeutic neoantigen vaccines using an in-house VLP-based vaccine platform.

2024 milestones

1. Our manuscript "Converging and evolving immuno-genomic routes leading to immune escape in breast cancer" has been published in Nature Communications: Blanco-Heredia, J.; Anjos-Souza, C.; Trincado, J.L.; et al. Nature Communications. 2024 15(1):1302. doi: 10.1038/s41467-024-45292-1.

2. Our group has co-authored a paper, led by the VIC group at **IrsiCaixa**, demonstrating the immunogenicity and anti-tumor activity of a VLP-based vaccine incorporating neoantigens predicted using a novel structure-based prediction pipeline: Barajas, A. et al. J Transl Med. 2024 22(1):14. doi: 10.1186/s12967-023-04843-8.

3. Dr. De la Iglesia has co-authored a paper from the GlioCat consortium (genomic studies of Glioblastoma): Gorria, T. et al The C250T Mutation of TERTp Might Grant a Better Prognosis to Glioblastoma by Exerting Less Biological Effect on Telomeres and Chromosomes Than the C228T Mutation. Cancers (Basel). 2024 16(4):735. doi: 10.3390/cancers16040735.

4. Our collaboration with the EAPM group at Barcelona Supercomputing Center (IP: Dr. Guallar) has allowed us to improve a novel neoantigen prediction pipeline that has been tested to predict neoantigens in human patient samples in a personalized manner. Experimental validation of the in silico predictions is ongoing.

5. Our PhD student, Cristina Benítez, presented her work at the DC2024 17th International Symposium on Dendritic Cells, developed in collaboration with the VIC group at **IrsiCaixa** (poster presentation: 'Identification of human immunogenic neoantigens using in silico prediction coupled to ex vivo functional validation').

3 **Published peer-reviewed papers**

1 **Poster presented**

1 **Invited talk**

Research group leader
Núria de la Iglesia Zaragoza

Head of bioinformatics department
Gustavo Rodríguez Esteban

Predoctoral researcher
Cristina Benítez Rodríguez

Senior laboratory technicians
Anna López Plana
Jeremy Tessier

6. Within the Transcan-3 JTC 2021 EU project, in collaboration with the team of Dr. Rosell and Dr. González-Cao (IGTP) and coordinated by Dr. Fornaguera at IQS, we have performed a genomic analysis, including neoantigen prediction, in a series of five NSCLC patients from Dexeus University Hospital. These experiments are part of a coordinated effort to develop a personalized mRNA-based neoantigen vaccine against NSCLC, using targeted polymeric nanoparticles.

Perspectives for the future

— To apply next-generation sequencing strategies, coupled with improved and novel bioinformatic pipelines and cutting-edge molecular biology procedures, to the identification and validation of immunogenic tumor-associated antigens.

— To identify therapeutic vulnerabilities in patients with solid tumors, especially pancreatic cancer, to design complementary immunotherapies to be used in combination with neoantigen vaccines.

— Working with immunologists and computational biologists, to lay solid foundations for the development of a therapeutic cancer vaccine for patients with solid tumours, taking advantage of the expertise of **IrsiCaixa** researchers currently working on vaccines against HIV, COVID-19 and other infectious diseases.

— To expand the team, secure collaborations with external partners and incorporate state-of-the-art molecular tools and new cost-effective in-house solutions for cancer immunotherapy.of a therapeutic cancer vaccine for patients with solid tumours, taking advantage of the expertise of **IrsiCaixa** researchers currently working on vaccines against HIV, COVID-19 and other infectious diseases.

— To expand the team, secure collaborations with external partners and incorporate state-of-the-art molecular tools and new cost-effective in-house solutions for cancer immunotherapy.house solutions for cancer immunotherapy.

Research support

Scientific and technical services

Sample processing and storage service

Since its establishment in 1993, **IrsiCaixa** has dedicated a special effort to the processing and preservation of biological samples to drive a wide range of research projects. Initially focused on supporting internal studies related to HIV infection, this activity has expanded considerably over the years. The scope of collaborations has grown, enabling the processing and storage of samples for numerous research projects and clinical trials in the fields of infectious diseases and cancer, supported by both **IrsiCaixa** and external sponsors at national and international levels. The institution's commitment to this activity has allowed us to establish a robust platform that significantly facilitates and enhances research efforts based on human biological samples. Currently, the service routinely processes and stores samples for 29 ongoing studies and maintains two extensive collections of samples (registered in the National Biobank Registry, No. C0000814 and No. C0006008) dedicated to research on HIV and other infectious diseases. Additionally, the service provides crucial support to **IrsiCaixa** researchers by conducting activities such as isolating peripheral blood mononuclear cells (PBMCs) from donor blood bags supplied by the Blood and Tissue Bank (BST), thawing PBMC vials, locating and delivering sample vials from **IrsiCaixa** collections, and coordinating both national and international sample shipments.

Sequencing service

Since its launch **IrsiCaixa** has used HIV genotyping techniques to determine resistance to antiretrovirals, initially on an experimental basis for patients included in clinical trials. The technique was soon found to be very useful for optimizing antiretroviral treatments and it eventually became evident that there was a need for all HIV-infected patients to have access to this technique. In 1999 the Sequencing Service was launched as a healthcare service to manage samples from the Germans Trias i Pujol University Hospital and other public and private centres. In addition to its healthcare role, the Sequencing Service also participates in research projects and clinical trials in collaboration with research groups and pharmaceutical companies. In 2018, the Sequencing Service implemented next-generation sequencing (NGS) technologies. In 2019, **IrsiCaixa** incorporated the Sentosa® SQ HIV genotyping assay to detect HIV drug resistance. This assay is validated in the highly automated Sentosa® NGS workflow, which enables automated RNA extraction, library construction, template preparation, sequencing, data analysis and automated reporting. The Sentosa® NGS workflow also ensures clear sample traceability, with seamless laboratory information system (LIS) integration and connectivity. To ensure the quality of its results, the Sequencing Service undergoes regular external quality controls (QCMD ENVA HIV-1 Drug Resistance Genotyping Proficiency Programme).

Other services

In the field of SARS-CoV-2 research, the ELISA test is a vital tool for detecting specific antibodies (IgM, IgG, IgA), offering valuable insights into immune responses, vaccine efficacy, and population-level immunity. It plays a central role in assessing vaccine performance, monitoring antibody dynamics, and conducting seroprevalence studies to evaluate exposure and herd immunity. Additionally, the test distinguishes between antibodies generated by natural infection and those induced by vaccination, facilitates the study of immune responses to viral variants, and identifies individuals with inadequate immunity. To support research groups conducting projects related to the COVID-19 pandemic, **IrsiCaixa**'s Services team performs specialized ELISA tests upon request.

Coordinator
Lidia Ruiz Tabuenca

Sample processing and storage service
Eulàlia Grau Segú
Rafaela Ayen Aparicio
Lucía Gómez Espada
Mireia Martínez Gamero

Sequencing service
Teresa Puig Oliva
Cristina Ramírez Soto

Assistant
Susana Esteban Raya

29 years of sample collection

Total of samples collected and stored

48,739 cells
80,650 plasma
11,046 serum
36,994 other specimens

Total: **177,429 samples**

2024

Samples collected for studies

1,356 cells
1,399 plasma
646 other specimens

Total: **3,401 samples**

193 Donor blood bags processed

Grants office

Head
Judith Dalmau

Team
Elisabet Fernández Rosas
Manel Garcia de la Fuente
Maria Belén Gómez Hornillos
David Jara Condo
Natàlia Marrugat Vila
Miriam Planell Molina
Cristina Saiz Masvidal
Sonia Bange Singh
Anaí Villanueva Delgado

The Grants office works closely with all **IrsiCaixa** departments and groups to promote the development of innovative and quality research. Continuous communication with researchers ensures support at all levels, whether in detecting needs, seeking suitable funding opportunities, performing projects follow-up and justification, assisting with proposal preparation and project management, designing and following up budgets and assisting in collaboration, transfer and innovation processes. The office ensures alignment of **IrsiCaixa**'s practices with the rules, regulations, and policies of funding entities, as well as with current national and international regulations.

In 2024, **IrsiCaixa** continued dedicating efforts to expand and strengthen the office to ensure its capacity to manage the large increase in the number and dimension of the current active projects, including a much higher number of projects coordinated by our center and increased internationalization.

120 Active projects in 2024

76
Coordinated by IrsiCaixa

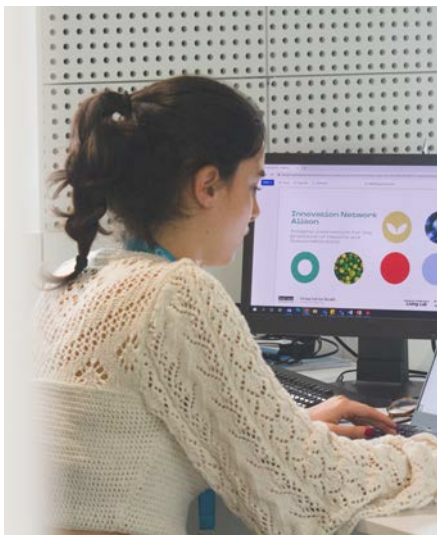
24
International projects

>50 Entities that support IrsiCaixa financially

Clinical Management Unit

Head
Judith Dalmau

Team
Jacopo Faranda Cordella
Cristina Gálvez Celada
Gemma Montagut Pino



IrsiCaixa strategically established the Clinical research Management Unit (CMU) in 2023,, given the escalating volume and intricacy of Clinical Studies at **IrsiCaixa**, many of which are coordinated internally, coupled with the heightened legal, administrative, and ethical requirements associated with such projects.

This unit further consolidated during 2024, and provides comprehensive support to ensure the seamless implementation and progression of clinical research projects at **IrsiCaixa**, offering guidance on all facets related to their execution and development.

The pivotal support areas of the CMU encompass:

1. **Regulatory aspects**, such as CEIC approvals and legal compliance in collaboration with **IrsiCaixa**'s legal department.

2. **Guidance on the design and methodology of clinical studies**, encompassing the development of protocols and documentation to ensure regulatory compliance and adherence to GCPs.

3. **Direction on data collection, storage, and dissemination** in collaboration with Data Management.

4. **Counsel and/or design of databases, flowcharts, and CRDs**, emphasizing the utilization of REDCap; and, in specific cases, support for patient/sample selection, coordination of multicenter projects, and internal and external communication with diverse partners and stakeholders.

Living Lab for Health

Head
Rosina Malagrida Escalas

Team
Marina Pino Cebrián
Laia Vives Adrián
Laura Ferrer Cendra

Presentation

During 2024, the Living Lab for Health at **IrsiCaixa** has continued to facilitate the implementation of the **IrsiCaixa** Strategic Impact Plan with the goal of enhancing the social relevance of research and innovation (R&I) while simultaneously promoting a more holistic approach to health.

To advance toward comprehensive health, the plan combines actions to improve the impact of R&I on diagnostic and therapeutic tools, as well as on prevention and health promotion interventions and on the combination of both, and it is structured around nine strategic lines.

The Living Lab has continued to make progress in enhancing how it promotes impact through transdisciplinary research processes combined with system thinking for research groups from different academic disciplines in collaboration with other key stakeholders, including, among others, those in the value chain, patients, and citizens.

Strategic lines and milestones achieved

1. Diagnosis: an analysis of the social impact achieved to date has been conducted by developing two impact narratives focused on the development of the HIPRA vaccine and the operationalization of HIV cure strategies for individuals with specific clinical conditions. Areas for improvement have been identified and addressed, including enhanced coordination with the Innovation Department.

2. Strategic impact plans: strategic guidance has been provided for projects, groups, consortia, and networks to optimize their impact. This included fostering the participation of diverse stakeholders in defining research and innovation strategies. Key examples include:

— **Supporting strategizing multistakeholder processes for promoting healthy and sustainable diets and preventing childhood obesity** in Catalonia in collaboration with the European projects FoodCLIC, Foster, CleverFood, and PREVENT, as well as CERCA, the Department of Health of Generalitat de Catalunya, and over 100 organizations.

— Submission of application for a European COST Action to create an **international Long COVID network**, where methodologies developed and published by the Living Lab will be promoted in collaboration with research groups across Europe. This proposal is part of the implementation of the Long COVID Strategic Impact Plan developed the previous year with Germans Trias i Pujol Hospital, **IrsiCaixa**, Fight Infections Foundation, and ICS-North Metropolitan Area, and is currently under evaluation.

— Supporting **IrsiCaixa**'s research group Virievac on its impact strategy through a dedicated service known as the **Strategy Lab**.

3. Patient participation: patient perspectives has been analysed and integrated to improve study and clinical trial protocols. A collaboration has been initiated with the EU funded project MISTRAL to analyse patients' perceptions, needs, concerns, expectations, and level of acceptance regarding a biomedical tool intended for use in a clinical trial (a combination of an HIV vaccine and a faecal transplant).

Additionally, efforts have continued to improve supportive care with patient participation in a clinical trial conducted by Vall d'Hebron as part of the European PRAGMATIL project, in collaboration with the "la Caixa" Foundation.

4. Transformative innovation in policies: a participatory and transdisciplinary process has been designed for the development of transformative policies that enable the implementation of research outcomes. The first pilot will focus on transforming food environments in vulnerable neighbourhoods, supported by the European projects FOSTER, CLEVERFOOD, and FoodCLIC and a second pilot is under development to support results implementation of the EU funded project LWNVIVAT.

5. Innovation networks: ongoing facilitation of three innovation networks to implement strategic plans developed in strategy line number 2 through co-design processes and pilot implementation, involving a wide range of stakeholders during iterative transition processes:

a) Infectious Disease Prevention and Mental Health Promotion Networks: these are supported within the framework of the Generalitat de Catalunya Sentinel Schools Network and the EU funded project LWNVIVAT.

b) Healthy and Sustainable Food Promotion Network: focused on vulnerable neighbourhoods and promoted through the previously mentioned food-related EU funded projects.

In 2024, over 5,478 individuals have participated in these networks, including researchers, patients, and professionals from various social sectors and students.

6. Process monitoring: monitoring and evaluating protocols have been designed to assess impact promotion processes for the three innovation networks and for the Sentinel Schools Network, these protocols have been implemented and published.

7. Dissemination and training on impact: results have been disseminated, and training on impact has been conducted, involving more than 400 participants annually, primarily from the academic sector. Conferences and undergraduate and postgraduate courses have been facilitated at various universities, including UOC, UB, and UAM.

Within the framework of the European partnership FutureFoodS, the Living Lab is contributing to the creation of a European network of Living Labs to promote mutual learning.

Additionally, work has been done on educational resources, including a guide to help researchers improve the drafting of the impact section in proposals, and a script is being developed for a video to be produced for UOC.

8. Research to improve impact: the Lab has been investigating on how to enhance the impact of research and innovation. Three scientific articles have been published in international journals, and three more are in development, one currently under review.

9. Commercialization of Living Lab services: the Lab has designed a commercialization plan to offer its services to other organizations with the final aim to accelerate the transition toward new approaches needed to promote impact.

The European project Integer4H selected the Lab to offer a mentoring process to design the plan and the Lab has begun offering services to third parties (e.g. UPC, Generalitat de Catalunya).

Main projects

EU funded projects:

CLEVERFOOD, Labs for Food system transformation
Participants: 22 partners
Start and end date: 01/23-12/26

FoodCLIC, integrated urban FOOD policies
Participants: 26 partners
Start and end date: 09/22-02/27

FOSTER, fostering food system transformation
Participants: 18 partners
Start and end date: 09/22-08/26

FutureFoodS Partnership
Participants: 87 partners
Start and end date: 2024-2034

PragmaTIL, Pragmatic approach to Adoptive Cell Therapy
Participants: 12 partners and the Living Lab for Health as subcontractor of "la Caixa" Foundation
Start and end date: 04/23-03/28

LWNVIVAT, Limiting West Nile Virus impact by novel vaccines and therapeutics approaches
Participants: 8 partners
Start and end date: 12/23-11/27

National funding:

Escoles Sentinella
Funding: Departament de Salut, Generalitat de Catalunya
Participants: 12 partners
Start and end date: 01/21-06/25

CaixaResearch Living Lab
Funding: "la Caixa" Foundation
Participants: Living Lab for Health at IrsiCaixa & ISGlobal
Start and end date: 01-12/2024

8
Current projects

3
Scientific publications

3
Innovation networks

3
Strategic impact plans

4
Pilots of health promotion implemented

2
Services commercialized

8086
Participants in the health promotion interventions

Communication

Team

Rita Casas Costa
Elena Lapaz Lorenzo

The IrsiCaixa communications department works to bridge the gap between the scientific knowledge generated in the laboratory and society, ensuring that this knowledge is shared and accessible to the broader population. Key tools for achieving this objective include the press, social media, and the website, which provide the reach needed to bring science closer to people and foster a stronger connection between science and society.

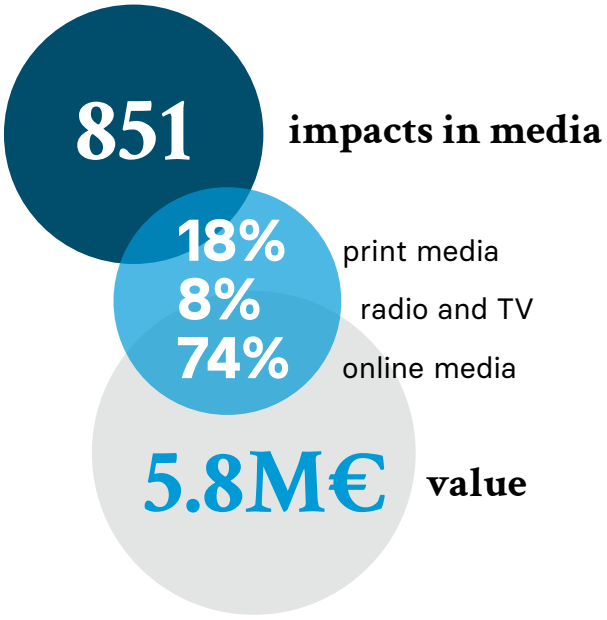
In addition to external communication, the communications team also manages internal communication, striving to build a strong and cohesive scientific team. Below, we briefly outline the department's activities of 2024:

Media

IrsiCaixa's extensive experience and leadership in the field of infectious diseases have positioned the institution and its research team as trusted references for the media. In 2024, IrsiCaixa handled reactive press inquiries and issued 9 press releases to general media outlets. These efforts resulted in 851 mentions across print, digital, radio, and television platforms, reaching an estimated audience of over 200 million people. The media value generated by IrsiCaixa is valued at approximately 6 million euros.

Website and social media

CFor IrsiCaixa, maintaining a strong online presence is essential to share its story, showcase its progress, and communicate the scientific breakthroughs emerging from the center's research with the world. To achieve this, IrsiCaixa operates across eight external channels, consistently growing its audience of followers and subscribers each year.



At the end of 2024, IrsiCaixa expanded its presence to the social platform Blusky, a space that fosters scientific discussions. This platform complements the center's other networks, enabling accurate dissemination and promotion of science.

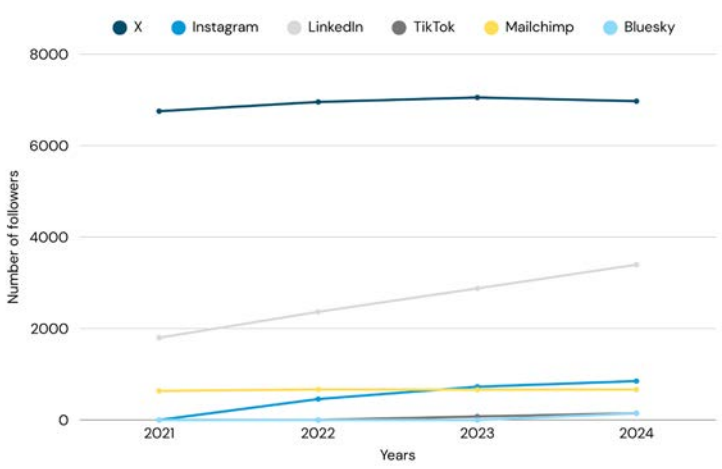
Internal communication

The department invests significant effort in fostering a sense of community within the IrsiCaixa team. One key initiative is the internal newsletter, published every two weeks, which highlights team news and projects, introduces new team members, shares the activity calendar, and includes other content of interest to the entire team.

Additionally, group activities are organized, such as the volleyball tournament, the Christmas dinner, and special events like Sant Jordi.

Impact			Followers, subscribers or users
	164,060	visits	97,204
	86,920	impressions	6,972
	61,374	impressions	850
	82,473	impressions	3,395
	80,235	video views	146
	12	external newsletters	666

Progress of followers



This year, a solidarity breakfast was held in support of the Dana in Valencia, and during Christmas, an advent calendar was introduced. Each day in December, the team received a challenge, culminating in a prize at the end of the month.

The communications department also coordinates the **IrsiCaixa** Alumni Network (IAN), which brings together former employees. As part of this initiative, they organized an event featuring talks by alumni and engaging debates.

Coordination of European project communication

The Communication Department plays a key role in the three European projects coordinated by **IrsiCaixa** (EPIVINF, LWNVIVAT, and MISTRAL), managing their communication efforts. This involves developing comprehensive action plans and overseeing their implementation.

This year, both EPIVINF and LWNVIVAT expanded their online presence by launching LinkedIn and Bluesky accounts, complementing their existing profiles on X.

Dissemination

A total of 15 interactive conference-debates were organized at various CaixaForums across Spain to share fundamental concepts and research on HIV/AIDS. These events engaged 1,357 students and 87 teachers, fostering active participation and discussion.

MISTRAL

- www.mistral-hiv.eu
- @mistralhiv
- internal newsletter

EPIVINF

- www.epivinf.eu
- @epivinf
- EPIVINF
- @epivinf
- internal newsletter

LWNVIVAT

- www.lwnvivat.eu
- @lwnvivat
- LWNVIVAT
- @lwnvivat
- internal newsletter

Featured news

A new antibody manages to block all variants of SARS-CoV-2 in preclinical models

A study with the participation of IrsiCaixa has led to the development of a new antibody that is active against all existing variants of SARS-CoV-2, including the Omicron subvariants currently circulating. It is a monoclonal antibody, a protein from the immune system developed in the laboratory, called 17T2. The isolation of the new antibody has been possible thanks to blood samples from a patient infected with SARS-CoV-2 in March 2020, during the first wave of the pandemic.

The "Geneva patient": first case of HIV cure with stem cell transplant without protective mutation

The "Geneva patient" joins the group of people who have achieved an HIV cure after a stem cell transplant, becoming the first person in the world to do so without their donor having the CCR5delta32 mutation, known for conferring protection against HIV infection. This unprecedented success, published in the journal Nature Medicine, was accomplished within the framework of the IciStem consortium, co-coordinated by IrsiCaixa.

Training

IrsiCaixa has been committed, from its inception, to training young researchers and developing successful careers in biomedical research. Its training objectives are realized as follows:

— Training of pre-doctoral researchers
— Training of post-doctoral researchers
— 2 training master and undergraduates' students
— Continuing professional development for staff
— 2 visiting researcher placements (we particularly welcome trainee researchers interested in learning from research groups).

25 Predoc researchers

43 Postdoc and senior researchers

418 Training attendees

11 Research results meetings

12 Journal clubs

34 Courses

Internal and external training

— **Fortnightly meetings at which group members present their results.** These meetings develop capacity to structure and defend experimental data before a restricted audience of experts in different fields.

— **Seminars.** IrsiCaixa and other Can Ruti Campus groups regularly organize open seminars with invited internationally renowned researchers.

— **Greater integration and collaboration between IrsiCaixa and the Can Ruti Campus.** This collaboration is translated into participation in coffee talks and scientific activities.

— **Training in skills to support you in your professional career.** To increase the ability of an individual in one or more areas of the professional career. Increase an individual's motivation to do their job well.

— **National and international conferences.** All staff are encouraged to participate in scientific encounters and to present their results at conferences.

— **Specialization/perfection courses in experimental techniques.**

— **Journal clubs.** Fortnightly meetings aimed at developing critical vision regarding published data in which researchers present an article of relevance to their own experimental work.

— **Newsletter.** Dissemination of a monthly IrsiCaixa Newsletter highlighting the most relevant scientific articles published by IrsiCaixa groups, courses and events organized by other entities and articles of general interest in matters of equality, compliance, biosafety, etc.

Chair in infectious diseases and immunity — University of Vic-Central University of Catalonia (UVic-UCC)

Since 2013, **IrsiCaixa** has collaborated with the Fight Infections Foundation (FLI) and the University of Vic-Central University of Catalonia (UVic-UCC) to promote the Chair of Infectious Diseases and Immunity, dedicated to the advancement and exchange of scientific and technological knowledge in all areas related to infectious diseases. Its mission is to foster collaboration, create synergies, and ensure the transfer of knowledge to society and industry through research collaborations but also through dissemination and training activities.

In 2024, the following training activities were lead by the Chair in Infectious Diseases and Immunity:

Date	Type of activity	Title	Place	Conducted by
January	Workshop	Infections in Traumatology	Faculty of Medicine, UVic-UCC	Esteban Reynaga Sosa
January	Workshop	Infections in Oncological-Haematological patients	Faculty of Medicine, UVic-UCC	Rosa Maria Benítez Díaz
February	Workshop	Acute Febril Syndrome in Primary Care	Faculty of Medicine, UVic-UCC	Carme Bracke
February	Workshop	Diabetic Foot	Faculty of Medicine, UVic-UCC	Esteban Reynaga Sosa
March	Lecture	Infections in Transplanted Patients (Solid Organs) or in Treatment with Immunomodulators	Faculty of Medicine, UVic-UCC	Rosa Maria Benítez Díaz
March	Workshop	Most Prevalent Infections in the Elderly	Faculty of Medicine, UVic-UCC	Jose Ramón Santos
April	Lecture	Aging	Faculty of Science, Technology and Engineering, UVic-UCC	Eugènia Negredo Puigmal
April	Lecture	Gastroenteritis	Faculty of Medicine, UVic-UCC	Jose Ramón Santos
May	Lecture	Parasites/International Traveler's Medicine	Faculty of Medicine, UVic-UCC	Sergio España
June	Lecture	Social Determinants of Health: the UN Sustainable Development Goals - Tuberculosis	Faculty of Medicine, UVic-UCC	Sergio España
June	Seminar	Telemedicine: Teleictus	Faculty of Medicine, UVic-UCC	Cora Loste Andreu
June	Seminar	Research Methodologies and Research with Clinical Trials	Faculty of Medicine, UVic-UCC	Javier Martínez-Picado
September	Lecture	Tuberculosis	Faculty of Science, Technology and Engineering, UVic-UCC	Sergio España
September	Seminar	European Science Night Talks (Science, Pandemics and Viruses)	Jaume High School and La Plana de Vic High School, Vic	Sara Morón López, Jon Izquierdo Pujol
October	Seminar	Monoclonal Antibodies	Faculty of Medicine, UVic-UCC	Julià Blanco Arbués
October	Lecture	Social Determinants of Health: the UN Sustainable Development Goals	Faculty of Science, Technology and Engineering, UVic-UCC	Roger Paredes
November	Workshop	Pulmonary TB and Extrapulmonary TB	Faculty of Medicine, UVic-UCC	Laura Soldevila
November	Seminar	Symposium: Research in Infectious Diseases	Faculty of Medicine, UVic-UCC	Beatriz Mothe, Javier Martínez-Picado
November	Seminar	T Cell Vaccine Development for Viral Pandemics: from HIV to COVID-19	Faculty of Science, Technology and Engineering, UVic-UCC	Christian Brander
December	Lecture	Endocarditis	Faculty of Medicine, UVic-UCC	Lourdes Mateu Pruñonosa
December	Lecture	Coronavirus	Faculty of Medicine, UVic-UCC	Lourdes Mateu Pruñonosa
December	Seminar	Monoclonal Antibodies: From Biotechnology to Clinical Use	Faculty of Science, Technology and Engineering, UVic-UCC	Julià Blanco Arbués

Innovation

Team
Cristina Val Cid
José Luis Pérez Guillamón

Following the establishment of the Innovation Department in 2023, **IrsiCaixa** has consolidated its strategic focus to knowledge transfer and research valorization.

Throughout 2024, the Innovation Department has reinforced its role in driving the transfer of research results and ensure they align with the values, needs, and expectations of society. Collaboration with industry, intellectual property protection, and active promotion are key elements in achieving successful transfer. The Innovation Department supports research groups by standardizing procedures for identifying transferable results and providing close guidance on intellectual property protection, licensing negotiations, and engagement with industry partners.

A highlight of 2024 has been the transfer of the therapeutic HIV vaccine development program from Aelix Therapeutics to Gilead Sciences, Inc. Following the successful advancement of the vaccine into a Phase IIa clinical trial, Aelix Therapeutics, SL—originally a spin-off from **IrsiCaixa**—transferred the program to Gilead for further clinical development and potential commercialization.

This international agreement represents a landmark success story in innovation and technology transfer, highlighting **IrsiCaixa**'s capacity to bring biomedical innovation to the global stage.

In parallel, **IrsiCaixa** has maintained active involvement in collaborative ecosystem aimed at maximizing its impact through cooperation with other institutes. The Innovation Department has participated in initiatives such as the CaixaResearch Institute innovation hub and the Innomed network promoted by the ITEMAS platform. Team members have also taken part in knowledge exchange activities through international forums such as ASTP and other events in the health innovation ecosystem.

Although the unit is still in an early stage of activity consolidation, 2024 has laid the groundwork for future measurable impact.

Among qualitative indicators:

— Increased engagement of research groups in IP discussions and early tech transfer advice.

— Standardization of asset evaluation procedures.

— Growing presence in strategic innovation networks.

Furthermore, in 2024, **IrsiCaixa** filed four new European patent applications:

— EP24382291
— EP24382932
— EP24382996
— EP24383125

Granted patents noteworthy in 2024

Title: Boosted immune monitoring methods for assaying antigen-specific T cell responses
Inventors: Marta Ruiz Riol, Alexandre Olvera van der Stoep, Luis Romero Martín, Christian Brander
Reference: WO/2023/170189
Priority date: 09/03/2022
Applicant: **IrsiCaixa**

Title: Immunogens for HIV vaccination
Inventors: Christian Brander, Beatriz Mothe Pujadas, Anuska Llano
Priority date: 30/01/2012
Reference: WO/2013/110818
Applicants: **IrsiCaixa**, ICREA, Laboratorios del Dr. Esteve, S.A.
Licensed to: Gilead Science, Inc.

Title: Virus-like particles with high-density coating for the production of neutralizing antibodies
Inventors: Luis Molinos, Jorge Carrillo, Julián Miguel Blanco Arbués
Reference: WO/2018/020324
Priority date: 27/07/2016
Publication date: 01/02/2018
Applicant: **IrsiCaixa**

Clinical and observational studies

1. MISTRAL

Microbiome-based stratification of individuals at risk of HIV-1 acquisition, chronic clinical complications,antimicrobial drug resistance,and unresponsiveness to therapeutic HIV-1 vaccination

Study type: observational
Design: longitudinal
Summary and objectives: The microbiome comprises all genetic material within microbiota, the set of microorganisms living in specific niches, one of which is the human gut. It has been shown that the microbiome plays an important role in the functioning of the immune system, so microbiome disturbance may cause immune disorders and chronic inflammation. Those conditions are hallmarks of HIV infection, yet few publications have addressed the potential role of the microbiome in HIV/AIDS. The focus of the MISTRAL (Microbiome-based stratification of individuals at risk of HIV-1 acquisition, chronic clinical complications, antimicrobial drug resistance, and unresponsiveness to therapeutic HIV-1 vaccination) EU-funded project is the relationship between the gut microbiota and HIV/AIDS, specifically HIV-1. MISTRAL ultimately aims to identify biomarkers to underpin the development of interventions that mitigate HIV infection and that enhance response to vaccines and therapies. The MISTRAL project will include an open-access database to support inpatient screening and stratification and a cloud-based tool to facilitate microbiome interpretation in research and clinical settings.
Start–end: 2019-2025
Sponsor: European Comission; H2020
Principal investigators: Dr Roger Paredes
Participating centres: Emory University, IHU Méditerranée Infection, CHIP (RegionH), Karolinska Institutet, Projecte dels NOMS-Hispanosida, ISGlobal, AELIX Therapeutics SL, IrsiCaixa
Code/reference: 847943

2. RUTIVAC-1

A Randomized, Double-Blind, Placebo Controlled Phase I Trial to Evaluate the Immunomodulatory Effect of RUTI® in Individuals with High-Risk Non-MuscleInvasive Bladder Cancer (NMIBC) Treated with Intravesical Bacillus Calmette-Guerin (BCG)

Study type: interventional
Design: phase I, double blind, placebocontrolled, randomized
Summary and objectives: the RUTIVAC-1 study is a Phase I Clinical Trial designed to evaluate the systemic and mucosal immunological response and provide safety information after the use of RUTI® administration to individuals with NMIBC. The study will enroll individuals treated with Transurethral resection of bladder tumor (TURBT), diagnosed to have highrisk Non-muscle invasive bladder cancer (NMIBC) and suitable candidates for BCG therapy and who meet all eligibility criteria. Forty individuals will be recruited and randomized 1:1 to receive two subcutaneous shots of 25g RUTI® or placebo. After vaccination, individuals will receive the standard intravesical Bacillus Calmette–Guerin (BCG) therapy with induction course (weekly BCG for six weeks) and maintenance course (three courses of weekly BCG for three weeks at 3, 6 and 12 months after induction). After the last intravesical BCG administration (BCG15, end of Interventional Phase) immunological assays will be performed and data will be analyzed. At the end of the Interventional Phase the blind will be opened, except for the study physicians who will remain blind during all the follow-up. All the individuals will be followed up for three years since TURBT.
Start–end: 2016-2024
Sponsor: Archivel Farma S.L
Principal investigator: Dr Cecilia Cabrera
Participating centres: Germans Trias i Pujol University Hospital (Urology Department), Fight Infections Foundation (CRO), IrsiCaixa
Code/reference: AC-16-048-CEIM (CEIC Code)

3. DUAL TRIPLE ART

Exploratory, open-label, randomized clinical trial to assess the efficacy of firstline dual vs. triple antiretroviral therapy (ART) in HIV-1 reservoir and in peripheral compartments in HIV-infected patients (Dual_TripleART)

Design: phase III
Recruitment: completed
Start–end: 2019 – 2024
Sponsor: ViiV Healthcare
Principal investigators: Dr José Moltó, Dr Javier Martínez-Picado
Participating centres: Germans Trias i Pujol University Hospital (Fihgt Infections Foundation); IrsiCaixa; University of North Carolina (Chapel Hill, USA), and the Oregon Health & Sciences University (Beaverton, USA)
Code/reference: 2019-002733-10

4. KING COHORT

Prospective Comparative Observational Cohort of individuals with documented SARS-CoV-2 infection (King cohort extension)

Study type: observational
Design: prospective cohort
Recruitment: ongoing
Summary and objectives: the KING cohort extension aims to be a prospective comparative observational cohort of infected SARS-CoV-2 individuals to have a unique clinical platform of biological specimens to study the virology and immunopathogenesis of SARS-CoV-2, during acute infection and after recovery of COVID-19. An uninfected group of individuals and a vaccinated group will be included. Patients suffering from PostCOVID-19 condition are also included in this cohort.
Start–end: 2020-ongoing
Sponsor: YoMeCorono crowdfunding campaign
Principal investigators: Dr Bonaventura Clotet, Dr Marta Massanella, Dr Lourdes Mateu
Participating centres: Germans Trias i Pujol University Hospital, Fight Infections Foundation, IrsiCaixa
Code/reference: HUGTiP/20-P-217

5. Aliança ProHEpiC-19 Neurocognitiu

Neurocognitive profile of Long Covid in adults living in Catalonia

Study type: observational
Design: retrosprospective/prospective observational study
Summary and objectives: clinical study dedicated to describe the neurological sequelae of people presenting with persistent neurocognitive-type COVID-19 syndrome, analyzing their relationship with the functional alterations and/or structural cerebral, with the inflammatory and

Clinical and observational studies

immunological state, the vascular and vestibular involvement, and its impact on the activities of daily life through the experiences they have experienced in coexistence with the persistent symptomatology.
Start–end: 2022-2024
Sponsor: Department of Health, Government of Catalonia
Principal investigators: Dr Julia Garcia Prado
Code/reference: SLT021/21/000038

6. BreakCOVID
SARS-CoV-2 post-vaccination infection: cohort study for the characterization of the immune response and development of a predictive model to establish revaccination criteria in Catalonia
Study type: observational
Design: retrosprospective/prospective observational study
Summary and objectives: clinical study dedicated to describing the neurological sequelae of people presenting with persistent neurocognitive-type COVID-19 syndrome, analyzing their relationship with the functional alterations and/ or structural cerebral, with the inflammatory and immunological state, the vascular and vestibular involvement, and its impact on the activities of daily life through the experiences they have experienced in coexistence with the persistent symptomatology.
Start–end: 2022-2024
Sponsor: Department of Health, Government of Catalonia
Principal investigators: Dr Marta Massanella
Code/reference: SLT021/21/000055

7. EPIVIRCO
Epigenetic regulation of host immunity and neurological long-term consequences of SARS-CoV-2 infection
Study type: observational
Design: retrospective/prospective observational study
Summary and objectives: the project examines if long-lasting epigenetic changes occurring after SARS-CoV-2 (COVID) infection determine the immunological and neurological longlasting effects observed in post-COVID conditions. After epigenetic profiling of different cell types from patients with long-COVID symptoms, the proposal will validate the hypotheses in a transgenic mouse model, which will be also used to evaluate therapeutic interventions and open new treatment options.
Start–end: 2022-2025
Sponsor: Fundació Bancària "la Caixa"
Principal investigators: Dr Christian Brander, Dr Marta Ruiz-Riol
Code/reference: HR22-00681

8. VRSVAC
Investigación de nueva vacuna para enfermedad respiratoria humana
Study type: observational
Design: preclinical study
Summary and objectives: the scope of the project is the development of a vaccine for a human respiratory disease (RSV or Respiratory Syncytial Virus).
Start–end: 2022-2025
Sponsor: HIPRA
Principal investigators: Dr Julià Blanco Arbués, Dr Nuria Izquierdo Useros
Code/reference: MIG-20211034

9. MetabolHIV
Ageing with HIV: The role of metabolism in viral persistence and accentuated immunoageing
Study type: observational
Design: prospective observational study
Summary and objectives: this project aims to understand the metabolic mechanisms that contribute to the immunosenescent phenotype, and giving new insights on the ongoing debate of premature or accentuated ageing of the HIV population. In addition, we will determine the role of metabolism in HIV persistence, which offer novel perspectives for the development of clinical strategies for HIV eradication.
Start–end: 2021-2025
Sponsor: MICINN, Proyectos de I+D+i 2020
Principal investigator: Dr Marta Massanella
Code/reference: PID2020-114929RA-I00

10. Long-CovidCIBERINFEC
Biomarkers and underlying immunopathological mechanisms of post COVID-19 condition
Study type: observational
Design: restrospective observational study
Summary and objectives: this project aims at identifying biomarkers of PCC to improve the diagnostic of PCC and provide understanding on the mechanisms underlying this condition, with the ultimate goal of determining treatment targets and interventions to improve the management and quality of life of PCC patients. Specific objectives are: 1) To assess SARS-CoV-2 persistence in blood and feces and reactivation of other viral latent infections, which may lead to chronic immune inflammation and dysfunction; 2) To determine immune dysregulation; 3) To quantify autoantibodies and markers of autoimmunity; 4) To assess metabolic dysregulation.
Sponsor: CIBERINFEC
Principal investigator: Dr Marta Massanella
Code/reference: IM22/INF/5

11. PediaCOVID
Pediatric long-COVID: clinical, immunological, genetic and virological evaluation of a cohort of children and adolescences
Study type: observational and interventional
Design: restrospective observational study
Summary and objectives: the primary objective of the project is to evaluate the causes and consequences of long-COVID in a unique pediatric cohort. Specific aims include: 1) to describe the main clinical, epidemiological and radiological characteristics, and the physical, psychological, academic and social consequences, 2) to unveil the genetic causes that may predispose to longCOVID, 3) to evaluate the immunological and inflammatory profile, 4) to investigate viral persistence, and 5) to analyze the neuronal damage to evaluate the longterm effect of COVID-19 on cognitive impairment. The project should allow to define specific clinical guidelines and personalized treatment strategies that should directly impact in the quality of life of the affected kids and their families.
Principal investigators: Dr Sara Morón

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López, Dr Javier Martínez Picado
Code/reference: PediaCOVID

12. RIDHIV
Reversing Immune Dysfunction for HIV eradication (RIDHIV)
Study type: observational
Design: restrospective observational study
Summary and objectives: the general aim of the project is to analyze the characteristics related to the reduction of the viral reservoirs in HIV+ participants and the main factors that can drive to absence of viral rebound after treatment interruption strategies. Moreover, one of the specific aims of the study will be to test the impact of the microbiome and metabolome on cognate CD4 T cell help and effector CD8 and B cell function and their capacity to control HIV reservoir size and HIV viral rebound. The hypothesis that host and microbial derived metabolomes will drive the development and persistence of cognate help which in turn will trigger an effector CD8 T cell response capable of maintaining low levels of replication competent virus will be tested. This will be tested in human cohorts, specifically in the LoViReT cohort, characterized for having a low HIV reservoir in absence of any intervention. The mechanisms downstream of the host and microbial metabolomes that control the adaptive immune response which is associated to the magnitude of the replication competent reservoir will be also assessed.
Start–end: 2021-2026
Sponsor: National Institutes of Health, USA (NIH)
Principal investigators: Dr Javier Martínez Picado, Dra Maria Salgado
Code/reference award (subaward): 1UM1AI164561-01 (70457-13543-IRSI)

13. Long-CovidCIBERINFEC
Evaluation of epigenetic regulated factors in peripheral blood and CSF in individuals with documented SARS-CoV-2 infection
Study type: observational
Design: comparative ambispective observational study
Summary and objectives: the main objective of the study is the identification of epigenetic imprints associated with CoV-2 infection in cells in the peripheral blood and the CSF and how these epigenetic marks are related to the long-term sequels and persistent symptomatology of CoV-2 infection, with especial focus on neurological disorders, for its targeting in vitro models for the identification of novels therapeutic strategies.
Principal investigator: Dr Christian Brander
Code/reference: PI-21-281

14. RBDCOV
Phase I/II study to evaluate the safety and immunogenicity of RBDCOV SARS-CoV-2 Vaccine in children and adolescents
Study type: observational/ interventional
Design: prospective Phase I/II clinical trial
Summary and objectives: the general project aims is a Phase I/II clinical trial in children and adolescents participants of the first RBDCOV COVID vaccine, which is based on a recombinant protein codifying for the SARS-CoV-2 RBD protein based on the sequence of the Wuhan variant. The aim is to test that COVID-19 Vaccine can be administered to the paediatric population and to find the best dose according to the age of children and adolescents. In addition, a variant vaccine, which contains the RBD for both the South African and UK variants, is also tested in adult participants with and without mild-to-moderate comorbidities and immunocompromised individuals. In IrsiCaixa, specific tasks include combining high-throughput and deep immune analyses to provide the required information for vaccine immune monitoring following the most updated regulatory recommendations and at the same time to generate novel mechanistic insights of response to vaccines with a particular focus on recognition of SARS-CoV-2 and related coronavirus variants, which will be crucial in the success of second-generation COVID-19 vaccine candidates.
Start–end: 2021-2024
Sponsor: European Comission (Horizon Europe)
Principal investigator: Dr Julia García Prado (WP leader in IrsiCaixa)
Code/reference: 101046118

15. BCN04-DASA
Safety and Impact of Dasatinib on Viral Persistence and Inflammation in People with HIV under Antiretroviral Treatment
Study type: interventional
Design: phase II, single-center, randomized, double-blind, placebo-controlled clinical trial in PWH
Summary and objectives: the primary objectives of the study are to evaluate the safety and tolerability of dasatinib administered at 70 mg once daily during 24 weeks in PWH on suppressive ART; and to evaluate the on-target/biological effect of dasatinib administered at 70 mg once daily during 24 weeks in PWH on suppressive ART on the reduction of SAMHD1 phosphorylation upon in-vitro T-cell activation, and its durability after completion of dasatinib treatment. Experimental exploratory aims are focused on: 1) to characterize the impact of dasatinib and its durability on the reservoir repertoire and maturation phenotypes; 2) to evaluate if the immunomodulatory effect of dasatinib on NK cells is driven by simultaneous CMV infection; 3) to further characterize immunological, viral, and microbiological responses to dasatinib therapy; and 4) to assess the impact of dasatinib and its durability on physical and cognitive functions in PWH with functional and/or cognitive decline.
Start–end: 2023-2026
Sponsor: ISCIII
Principal investigator: Dr Beatriz Mothe
Code/reference: EudraCT 2023-000061-14

16. LWNVIVAT
Limiting West Nile Virus impact by novel vaccines and therapeutics approaches: in vitro immunogenicity prediction of WNV proteins-candidates in peripheral blood cells
Study type: observational
Design: observational, cross-sectional
Summary and objectives: the general objective of WP4 is to evaluate the immunogenicity of WNV proteins candidates as antigens for vaccine development. This study will combine in vitro testing of vaccine candidates in human tonsil organoids and peripheral blood cells to provide information about their capability to elicit human B- and T-cell responses. In addition, these

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experiments will provide information on the mechanistic insights of WNV immune response priming in humans. This information will be crucial to advance the immunogenicity antigen profile for the successful selection of WNV vaccine candidates.
Start–end: recruitment period 2024-2026 / experimental period 2025 - 2027
Sponsor: Europen Comission – Horizon Europe
Principal investigator: Dr jorge Carrillo
Code/reference: 101137248

17. OMIT-HIV
Multi-omic understanding of the transformed host T-cell response to HIV following therapeutic vaccination
Study type: observational
Design: observational retrospective
Summary and objectives: the purpose of the study is to gain a deeper understanding of how HIV therapeutic vaccine regimens can qualitatively transform the pre-existing, generally ineffective immune response against HIV into one that is effective in controlling rebounding virus after ART is stopped. In this project, we will characterize the extent to which the vaccine delivery systems and regimens that currently lead the HIV therapeutic vaccine field are able to transform HIV-specific T cell immunity, and what impact this has on posttreatment control of infection. The current project will analyze stored samples of 45 individuals who participated in the AELIX002 clinical trial and 10 samples of health volunteers of HIV-CORE 0051 clinical trial.
Start–end: 2023-2028
Sponsor: National Institutes of Health (NIH)
Principal investigator: Dr Christian Brander
Code/reference: P01AI178375

18. Cardiometabol
Monocytes imprints as predictors of cardiovascular risk in PLWH
Study type: observational
Design: cross-sectional
Summary and objectives: the main objective of this project is to elucidate the metabolic profile and epigenetic hallmarks of monocytes in PLWH in order to decipher their relationship with systemic inflammation and CVD. This study will be performed at the HIV Unit of Hospital Universitari Mútua Terrassa (HUMT), a reference centre with more than 450 HIV patients. This project will include the HUMT cohort (PLWH followed by our Unit since 2010) and non-infected individuals cohort followed by REGICOR (REgistre GIroní del COR). A cross-sectional comparison of inflammatory, metabolic and epigenetic biomarkers will be performed comparing PLWH vs seronegative controls with or without cardiovascular disease (samples 2023). In addition, longitudinal assessment of metabolic and epigenetic biomarkers to determine predictors of cardiovascular events apparition overtime (samples 2010, 2018, 2023) will be performed.
Start–end: 2023-2025
Sponsor: Hospital Mutua de Terrassa
Principal investigators: Dr David Dalmau Juanola (general PI), Dr Marta Massanella Luna (PI at IrsiCaixa)
Code/reference: GLD22-0014

19. DoluRil
Inflammatory biomarkers in PLWH: 2-drug regimen vs 3-drug regimen in late switch
Study type: observational
Design: ambispective observational study
Summary and objectives: the purpose of the study is to assess if being exposed to a 2-drug regimen for a period of 2 years or longer is associated or not with inflammatory biomarkers in peripheral blood cells (lymphocytes and monocytes) in PLWH compared to those who maintained 3-drug regimen for the same period. Also, to assess clinical factors associated with the presence of inflammatory biomarkers.
Start–end: 2024-2025
Sponsor: Hospital Mutua de Terrassa
Principal investigators: Dr David Dalmau Juanola (general PI), Dr Marta Massanella Luna (PI at IrsiCaixa)
Code/reference: DoluRil

20. CTL-Resistance
Understanding the development of resistance to t-cell mediated killing in the hiv reservoir: identifying novel targets to improve immune-mediated cure strategies
Study type: observational
Design: ambispective observational study
Summary and objectives: the purpose of the study is to define an optimal treatment window by longitudinally evaluating resistance to T cell-mediated killing and the antiviral capacity of CD8 cells following HIV-1 infection and upon initiation of cART in individuals with HIV who are treated early (≤ 3 months) and late (> 6 months). It also seeks to assess the effects of candidate drugs designed to reverse CTL-mediated killing resistance on the HIV-1 reservoir, in combination with CD8 T cells expanded with HTI ex vivo, and to identify new markers associated with killing resistance that could be targeted therapeutically.
Start–end: 2024-2027
Sponsor: Ministerio de Ciencia, Innovación y Universidades. Proyectos de I+D+I en Salud 2024 (ISCIII)
Principal investigator: Dr Beatriz Mothe
Code/reference: PI24/01851

21. EPIVINF
Epigenetic regulation of host factors in viral infections
Study type: observational
Design: observational, transversal, descriptive study
Summary and objectives: the purpose of the study is to assess the impact of acute viral infections on the epigenetic control of host proteins that are involved in the immune response to infection and disease evolution (severity in acute infection and neurological disorders) and to determine how such persistent epigenetic marks influence long-term disease and serve as a predictor of the success of vaccination or intervention strategies.
Start–end: 2023-2025
Sponsor: European Commission – Horizon Europe
Principal investigator: Dr Christian Brander
Code/reference: 101057548

22. VirCom
Dissecting CD169-mediated endocytic mechanisms in myeloid cells and their contribution to virus dissemination
Study type: observational
Design: observational, transversal study
Summary and objectives: the purpose

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of the study is to understand how compartments containing viruses form within myeloid cells and their implications for viral dissemination, in order to identify new therapeutic opportunities that could limit infection and enhance the protection of exposed hosts.
Start–end: 2023-2026
Sponsor: Ministerio de Ciencia, Innovación y Universidades
Principal investigator: Dr javier Martínez Picado, Dr Patricia Resa Infante
Code/reference: PID2022 - 139271OB - I00

23. RUTIVAC-2
Long-Term Efficacy of RUTI, an Immunomodulatory Agent, in Patients with Non-Muscle Invasive Bladder Cancer: A 5-Year Follow-Up Study
Study type: observational
Design: prospective observational
Summary and objectives: the purpose of the study is to evaluate the rate of recurrence, progression and overall survival up to 5 years from transurethral resection in patients who participated in the RUTIVAC-1 study.
The purpose of the RUTIVAC-1 Clinical Trial was to use RUTI® as an immunomodulatory agent in the treatment of high-risk non-muscle-invasive bladder cancer (NMIBC) to stimulate the immune system before standard intravesical Bacillus Calmette–Guerin (BCG) therapy. In this study a heterologous prime– boost strategy was used, that consisted in priming the immune response with the administration of RUTI® and then boosting this immunity by the administration of intravesical BCG therapy. RUTI® and BCG share most of the antigens, however they are presented to the immune system in a completely different context. The efficacy effect was evaluated after 3 years in which it was observed that Placebo and RUTI® group showed a very low number of recurrence and progression events and that RUTI® administration was associated with a longer disease-free survival.
Start–end: 2024 – 2024
Sponsor: IGTP
Principal investigator: Dr Cecilia Cabrera Navarro
Code/reference: PI-24-163

24. PCR4ALL
Impact and viability of a novel mass PCR testing method as a pandemic-fighting strategy
Study type: observational
Design: retrospective observational study
Summary and objectives: the primary objective of the PCR4ALL project is to validate the scalability and efficacy of a customized sample collection device and a droplet-based digital PCR (ddPCR) microfluidic system for the detection of viral infectivity (e.g., SARS-CoV-2). The system aims to achieve high-throughput performance (>100,000 tests per day) with adequate sensitivity, specifically targeting viral samples with Ct values ≥ 25. Retrospective nasopharyngeal swab and saliva samples from the KING extension cohort will be utilized, in collaboration with Dr. Massanella (IrsiCaixa). The study will include up to 25 SARS-CoV-2 positive samples with validated viral loads (covering a broad range of Ct values, with a focus on Ct values between 20 and 30) and up to 15 SARS-CoV-2 negative samples, both collected simultaneously.
Start–end: 2024 – 2030
Sponsor: European Comission – Horizon Europe
Principal investigator: Dr Javier Martínez Picado
Code/reference: 101095606

25. MultiOMICs
Multi-OMICS identification and validation of mechanisms triggered by immune interventions aimed at reducing the size of the replication competent reservoir
Study type: observational
Design: longitudinal, retrospective
Summary and objectives: this study hypothesizes that immune therapies activating both innate and adaptive immune responses will more effectively reduce the HIV reservoir and limit viral rebound after ART cessation. Specifically, distinct microbiomes and metabolomes in HIV-cancer patients prior to anti-PD-1/PD-L1 intervention may influence virological (vDNA, vRNA) and immunological outcomes shortly after treatment, while specific host and microbial metabolites may affect the engraftment of allo-HSCT and autologous CCR5-modified CD4+ T cells by promoting innate immune activation, controlling viral rebound, and regulating HIV-specific T cell differentiation. The objectives are to assess the quantity and quality of the HIV reservoir post-intervention, define early innate and adaptive immune responses triggered by anti-PD-1 or allo-HSCT, and identify pre-intervention microbiome- and metabolome-driven immune mechanisms modulating reservoir decay. Additionally, the study aims to evaluate the host environment's role in shaping virological and immunological heterogeneity, host-donor chimerism, innate immune activation, and stem-like CD4+ T cell reconstitution in allo-HSCT-treated patients, as well as to define shared mechanisms of viral control following autologous CCR5-modified CD4+ T cell therapy and allo-HSCT.
Start–end: 2024 – 2028
Sponsor: NIH
Principal investigator: Dr Javier Martínez Picado
Code/reference: 1P01AI178376-01

26. RRI-MISTRAL
MISTRAL patients' perception study
Study type: observational
Design: descriptive cross-sectional qualitative study
Summary and objectives: this study aims to explore patients' perceptions of the challenges, needs, opportunities, and expectations surrounding the combination of HIV vaccines and Fecal Microbiota Transplantation (FMT). Secondary objectives include assessing the acceptability and urgency of combining these treatments, understanding patient expectations in clinical trials, and exploring methodological challenges across different phases of trials. The research is a descriptive, cross-sectional qualitative study, coordinated by the Living Lab for Health at IrsiCaixa within the EU-funded MISTRAL project. Four focus groups (FGs) will be conducted: one with local patients from Barcelona, one with international patients (online), and two with professionals experienced in FMT research (online). The FGs will

last two hours, and discussions will be in English, except for the local patient FG, which will be in Spanish or Catalan.
Start–end: 2025 – 2025
Sponsor: European Comission – H2020
Principal investigators: Rosina Malagrida, Dr Roger Paredes
Code/reference: RRI-MISTRAL

27. Opti-FliP
Optimal T-cell support for HIV neutralizing antibody induction to fusion peptide-inclusive regimens
Study type: observational
Design: retrospective and prospective study
Summary and objectives: this study investigates the role of CD8+ T follicular cells (Tfc) with high functional avidity T-cell receptors (TCRs) in driving broadly neutralizing antibody (bNAb) maturation in HIV vaccination. While CD4+ T follicular helper (Tfh) cells are crucial for bNAb induction, the immune response against HIV remains challenging due to the virus's diversity and the inability of current vaccines to broadly neutralize across strains. CD8+ Tfc cells, being HIV-resistant and localized in germinal centers, may serve as an alternative to CD4+ Tfh cells. Our preliminary data suggest that CD8+ Tfc cells, particularly the CD103+ subset, have higher functional avidity and may play a significant role in enhancing bNAb responses. The primary objective of this study is to identify HIV Envelope (Env) sequence motifs targeted by both CD4+ and CD8+ Tfc cells with high functional avidity and their role in promoting accelerated bNAb development. Secondary objectives include evaluating the relationship between pre-existing or vaccine-induced Tfc responses and antibody-mediated immunity in a therapeutic vaccine trial and determining whether follicular T cells can activate virus-specific B cells to promote maturation in vitro and ex vivo.
Start–end: 2024 – 2029
Sponsor: NIH
Principal investigator: Dr Christian Brander
Code/reference: P01AI181044

Publications & conferences

Publications

1. Alcalde-Herraiz M, Català M, Prats-Uribe A, Paredes R, Xie J, Prieto-Alhambra D. **Genome-wide association studies of COVID-19 vaccine seroconversion and breakthrough outcomes in UK Biobank**. *Nature Communications*. 2024;15(1):8739.

2. Amengual-Rigo P, Gracia Carmona O, Anjos-Souza C, Varela I, Lepore R, Vázquez M et al. **Virus-like particle-mediated delivery of structure-selected neoantigens demonstrates immunogenicity and antitumoral activity in mice**. *Journal of Translational Medicine*. 2024;22(1):14.

3. Ávila-Nieto C, Vergara-Alert J, Amengual-Rigo P, Ainsua-Enrich E, Brustolin M, Rodríguez de la Concepción ML et al. **Immunization with V987H-stabilized Spike glycoprotein protects K18-hACE2 mice and golden Syrian hamsters upon SARS-CoV-2 infection**. *Nature Communications*. 2024;15(1):2349.

4. Bailón L, Alarcón-Soto Y, Rivero A, Rosen EP, Estes JD, Moltó J et al. **Impact of Dolutegravir plus Lamivudine as First-Line Antiretroviral Treatment on HIV-1 Reservoir and Inflammatory Markers in Peripheral Blood**. *The Journal of Infectious Diseases*. 2024.

5. Bailón L, Sábato S, Coll J, Santos JR, Miranda C, Puig T et al. **Early virological failure with cabotegravir/rilpivirine**. *The Journal of Antimicrobial Chemotherapy*. 2024.

6. Bayón-Gil Á, Hernández I, Dalmau J, Nieto JC, Urrea V, Garrido-Sanz L et al. **Host genetic and immune factors drive evasion of HIV-1 pathogenesis in viremic non-progressors**. *Med*. 2024.

7. Benet S, Mendoza A, Rivero A, Alemany A, Descalzo V, Alarcón-Soto Y et al. **Immune responses associated with mpox viral clearance in men with and without HIV in Spain: a multisite, observational, prospective cohort study**. *The Lancet Microbe*. 2024.

8. Bengu N, Cromhout G, Adland E, Govender K, Herbert N, Lim N et al. **Sustained aviraemia despite anti-retroviral therapy non-adherence in male children following in utero hiv transmission**. *Nature Medicine*. 2024.

9. Blanco-Heredia J, Souza CA, Trincado JL, Gonzalez-Cao M, Gonçalves-Ribeiro S, Gil SR et al. **Converging and evolving immuno-genomic routes toward immune escape in breast cancer**. *Nature Communications*. 2024;15(1):1302.

10. Bordoy AE, Vallès X, Fernández-Náger J, Sánchez-Roig M, Fernández-Recio J, Saludes V et al. **Analysis of a large SARS-CoV-2 (Alpha) outbreak in a Catalan prison using conventional and genomic epidemiology**. *The Journal of Infectious Diseases*. 2024.

11. Borgognone A, Casadellà M, Martínez de Lagrán M, Paredes R, Clotet B, Dierssen M et al. **Lamivudine modulates the expression of neurological impairment-related genes and LINE-1 retrotransposons in brain tissues of a Down syndrome mouse model**. *Frontiers in Aging Neuroscience*. 2024;16:1386944.

12. Carmona-Cervelló M, León-Gómez BB, Dacosta-Aguayo R, Lamonja-Vicente N, Montero-Alía P, Molist G et al. **Long COVID: cognitive, balance, and retina manifestations**. *Frontiers in Medicine*. 2024;11:1399145.

13. Català-Moll F, Paredes R. **The rectal microbiome: understanding its role in HIV transmission**. *Current opinion in HIV and AIDS*. 2024.

14. Dacosta-Aguayo R, Puig J, Lamonja-Vicente N, Carmona-Cervelló M, Biaani León-Gómez B, Monté-Rubio G et al. **Reduced Cortical Thickness Correlates of Cognitive Dysfunction in Post-COVID-19 Condition: Insights from a Long-Term Follow-up**. *AJNR American Journal of Neuroradiology*. 2024.

15. Dacosta-Aguayo R, Torán-Monserrat P, Carmona-Cervelló M, León-Gómez BB, Mataró M, Puig J et al. **Multimodal neuroimaging in Long-COVID and its correlates with cognition 1.8 years after SARS-CoV-2 infection: a cross-sectional study of the Aliança ProHEpiC-19 Cognitiu**. *Frontiers in Neurology*. 2024;15:1426881.

16. de Campos-Mata L, Trinité B, Modrego A, Tejedor Vaquero S, Pradenas E, Pons-Grífols A et al. **A monoclonal antibody targeting a large surface of the receptor binding motif shows pan-neutralizing SARS-CoV-2 activity**. *Nature Communications*. 2024;15(1):1051.

17. Estany A, Piro FN, Broerse JEW, Malagrida R. **Science Shops as key intermediary structures to respond to the current health research agenda bias: Evidence from the InSPIRES project**. *Health expectations: an international journal of public participation in health care and health policy*. 2024;27(2):e14052.

18. Fornt-Suñé M, Puertas MC, Martinez-Picado J, García-Prado J, Ventura S. **Protein Nanoparticles for Targeted SARS-CoV-2 Trapping and Neutralization**. *Advanced Healthcare Materials*. 2024;:e2402744.

19. Franco S, Mateu L, Pluvinet R, Sanchez-Herrero JF, Toledo R, Sumoy L et al. **Altered Plasma microRNA Signature in Hospitalized COVID-19 Patients Requiring Oxygen Support**. *Microorganisms*. 2024;12(3).

20. Gandasegui J, Grau-Pujol B, Novela V, Muchisse O, Cambra-Pellejà M, Cossa A et al. **Deep-amplicon sequencing of the complete beta-tubulin gene in Trichuris trichiura before and after albendazole treatment**. *International Journal for Parasitology, Drugs and Drug Resistance*. 2024;26:100570.

21. Garcia-Vidal E, Calba I, Riveira-Muñoz E, García E, Clotet B, Serra-Mitjà P et al. **Nucleotide-Binding Oligomerization Domain 1 (NOD1) Agonists Prevent SARS-CoV-2 Infection in Human Lung Epithelial Cells through Harnessing the Innate Immune Response**. *International Journal of Molecular Sciences*. 2024;25(10).

22. Geli MI, Enrich C, Laguía F, Chojnacki J, Erkizia I, Martinez-Picado J et al. **Massive endocytosis mechanisms are involved in uptake of HIV-1 particles by monocyte-derived dendritic cells**. *Frontiers in Immunology*. 2024;15:1505840.

23. González-Navarro I, Urrea V, Gálvez C, Garcia-Guerrero MDC, Morón-López S, Puertas MC et al. **Assessing advances in three decades of clinical antiretroviral therapy on the HIV-1 reservoir**. *The Journal of Clinical Investigation*. 2024.

24. Gorria T, Crous C, Pineda E, Hernandez A, Domenech M, Sanz C et al. **Might Grant a Better Prognosis to Glioblastoma by Exerting Less Biological Effect on Telomeres and Chromosomes Than the C228T Mutation**. Cancers. 2024;16(4).

Publications

25. Gualdrón-López M, Ayllon-Hermida A, Cortes-Serra N, Resa-Infante P, Bech-Serra JJ, Aparici-Herraiz I et al. **Proteomics of circulating extracellular vesicles reveals diverse clinical presentations of COVID-19 but fails to identify viral peptides**. *Frontiers in Cellular and Infection Microbiology*. 2024;14:1442743.

26. Hajam IA, Tsai CM, Gonzalez C, Caldera JR, Lázaro Díez M, Du X et al. **Pathobiont-induced suppressive immune imprints thwart T cell vaccine responses**. *Nature Communications*. 2024;15(1):10335.

27. Izquierdo-Pujol J, Morón-López S. **The importance of post-COVID condition phenotypes characterization to decipher the mechanisms underlying this post-viral syndrome**. *World Journal of Pediatrics WJP*. 2024.

28. Izquierdo-Pujol J, Puertas MC, Martinez-Picado J, Morón-López S. **Targeting Viral Transcription for HIV Cure Strategies**. *Microorganisms*. 2024;12(4).

29. Jimenez-Leon MR, Gasca-Capote C, Roca-Oporto C, Espinosa N, Sobrino S, Fontillon-Alberdi M et al. **Vedolizumab and ART in recent HIV-1 infection unveil the role of alpha4beta7 in reservoir size**. *JCI insight*. 2024.

30. Keshtkar-Jahromi M, Anstrom KJ, Barkauskas C, Brown SM, Daar ES, Fischer W et al. **ACTIV trials: Lessons learned in trial design in the setting of an emergent pandemic**. *Journal of Clinical and Translational Science*. 2024;8(1):e151.

31. Landete P, Caliman-Sturdza OA, Lopez-Martin JA, Preotescu L, Luca MC, Kotanidou A et al. **A phase III randomized controlled trial of plitidepsin, a marine derived compound, in hospitalized adults with moderate COVID-19**. *Clinical Infectious Diseases*. 2024.

32. Lee MJ, Eason M, Castagna A, Laura G, De Scheerder MA, Riley J et al. **The impact of analytical treatment interruptions and trial interventions on time to viral re-suppression in people living with HIV restarting ART in cure-related clinical studies: a systematic review and meta-analysis**. *Journal of the International AIDS Society*. 2024;27(8):e26349.

33. Lladós G, Massanella M, Paredes R, Mateu L. **Vagus Nerve Dysfunction in the Post-COVID-19 Condition**. *Clinical Microbiology and Infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases*. 2024.

34. López Fernández MJ, Narejos S, Castro A, Echave-Sustaeta JM, Forner MJ, Arana-Arri E et al. **Omicron XBB.1.16-Adapted Vaccine for COVID-19: Interim Immunogenicity and Safety Clinical Trial Results**. *Vaccines*. 2024;12(8).

35. Losada A, Izquierdo-Useros N, Aviles P, Vergara-Alert J, Latino I, Segalés J et al. **Plitidepsin as an Immunomodulator against Respiratory Viral Infections**. *Journal of Immunology* (Baltimore, Md. : 1950). 2024.

36. Loste C, Trigueros M, Muñoz-López F, Urrea V, Martínez A, González S et al. **Immunoaging at Early Ages Could Drive a Higher Comorbidity Burden in People with HIV on Antiretroviral Therapy Compared with the Uninfected Population**. *International Journal of Molecular Sciences*. 2024;25(20).

37. Marín-Sánchez N, Paredes R, Borgognone A. **Exploring potential associations between the human microbiota and reservoir of latent HIV**. *Retrovirology*. 2024;21(1):21.

38. Martinez-Picado. **40 years fighting the human immunodeficiency virus (HIV), but still no definitive cure**. *Treballs de la Societat Catalana de Biologia*. 2024;74:11-24.

39. Mateu LM, Franco SF, Trigueros MT, Palacín DP, Bonet-Simó JM.B-S, Isnard MdM.I et al. **MMS19 and IFIH1 Host genetic variants associate with SARS-CoV-2 infection in elderly residents of long-term care facilities**. *COVID*. 2024;4(8):1245-1252.

40. Millat-Martinez P, Gharbharan A, Alemany A, Rokx C, Geurtsvankessel C, Papageorgiou G et al. **Prospective individual patient data meta-analysis of two randomized trials on convalescent plasma for COVID-19 outpatients**. *Nature Communications*. 2024;15(1):4352.

41. Mills AM, Rizzardini G, Ramgopal MN, Osiyemi OO, Bogner JR, Hagins DP et al. **Switch to fixed-dose doravirine (100 mg) with islatravir (0·75 mg) once daily in virologically suppressed adults with HIV-1 on bictegravir, emtricitabine, and tenofovir alafenamide: 48-week results of a phase 3, randomised, controlled, double-blind, non-inferiority trial**. *The Lancet HIV*. 2024.

42. Mørup SB, Leung P, Reilly C, Sherman BT, Chang W, Milojevic M et al. **The association between single-nucleotide polymorphisms within type 1 interferon pathway genes and human immunodeficiency virus type 1 viral load in antiretroviral-naïve participants**. *AIDS Research and Therapy*. 2024;21(1):27.

43. Nevo S, Frenkel N, Kadouri N, Gome T, Rosenthal N, Givony T et al. *Tuft cells and fibroblasts promote thymus regeneration through ILC2-mediated type 2 immune response*. **Science Immunology**. 2024;9(91):eabq6930.

44. Olvera A, Romero-Martin L, Oriol-Tordera B, Rosas-Umbert M, Escribà T, Mothe B et al. **Impact of ChAdOx1 or DNA Prime Vaccination on Magnitude, Breadth, and Focus of MVA-Boosted Immunogen-Specific T Cell Responses**. *Vaccines*. 2024;12(3).

45. Ortiz R, Barajas A, Pons-Grífols A, Trinité B, Tarrés-Freixas F, Rovirosa C et al. **Production and Immunogenicity of FeLV Gag-Based VLPs Exposing a Stabilized FeLV Envelope Glycoprotein**. *Viruses*. 2024;16(6).

46. Palladino C, Ramis R, Ezeonwumelu IJ, Biondi A, Carreras G, Fischer F et al. **Impact of the 2008 economic crisis on the burden of hepatitis B and C diseases in Southern European countries**. *BMC Public Health*. 2024;24(1):1642.

47. Panisello C, Aschero R, Martinez-Moreno A, Roca Ho H, Falgas A, González-Navarro EA et al. **NSGS mice humanized with cord blood mononuclear cells show sustained and functional myeloid-lymphoid representation with limited graft-versus-host disease**. *Journal for Immunotherapy of Cancer*. 2024;12(10).

48. Pous A, Bernat-Peguera A, López-Paradís A, Cirauqui B, Quiroga V, Teruel I et al. **Deciphering HER2-low breast cancer (BC): insights from real-world data in early stage breast cancer**. *Therapeutic Advances in Medical Oncology*. 2024;16:17588359241290720.

49. Resa-Infante P, Erkizia I, Muñiz-Trabudua X, Linty F, Bentlage AEH, Perez-

Publications

Zsolt D et al. **Preclinical development of humanized monoclonal antibodies against CD169 as a broad antiviral therapeutic strategy**. *Biomedicine & Pharmacotherapy*. 2024;175:116726.

50. Rotta G, Achille V, Bornheimer SJ, Duenas M, Fernandez M, Gatti A et al. **Protocol for flow cytometry immunophenotyping of human antigen-specific T cells by activation-induced marker and Th1 cytokine detection**. *STAR protocols*. 2024;6(1):103343.

51. Roure S, Vallès X, Pérez-Quílez O, López-Muñoz I, Chamorro A, Abad E et al. **Female genitourinary schistosomiasis-related symptoms in long-term sub-Saharan African migrants in Europe: a prospective population-based study**. *Journal of Travel Medicine*. 2024.

52. Roure S, Vallès X, Pérez-Quílez O, López-Muñoz I, Chamorro A, Abad E et al. **Male genitourinary schistosomiasis-related symptoms among long-term Western African migrants in Spain: a prospective population-based screening study**. *Infectious Diseases of Poverty*. 2024;13(1):23.

53. Roure S, Vallès X, Pérez-Quílez O, López-Muñoz I, Valerio L, Soldevila L et al. **Estimating the morbidity burden of imported chronic schistosomiasis among West African migrants in the Northern Metropolitan Area from Barcelona (Spain): a prospective community-based research**.*The Journal of Infection*. 2024;106234.

54. Rubio Garcia E, Casadellà M, Parera M, Vila J, Paredes R, Noguera-Julian M. **Gut resistome linked to sexual preference and HIV infection**. *BMC Microbiology*. 2024;24(1):201.

55. Rubio R, Yavlinsky A, Zamudio ME, Molinos-Albert LM, Pérez CM, Pradenas E et al. **Initial antigen encounter determines robust T-cell immunity against SARS-CoV-2 BA.2.86 variant three years later**. *The Journal of Infection*. 2024;:106402.

56. Ruiz de Porras V, Bernat-Peguera A, Alcon C, Laguia F, Fernández-Saorin M, Jiménez N et al. **Dual inhibition of MEK and PI3Kbeta/delta-a potential therapeutic strategy in PTEN-wild-type docetaxel-resistant metastatic prostate cancer**. *Frontiers in Pharmacology*. 2024;15:1331648.

57. Sáez-Cirión A, Mamez AC, Avettand-Fenoel V, Nabergoj M, Passaes C, Thoueille P et al. **Sustained HIV remission after allogeneic hematopoietic stem cell transplantation with wild-type CCR5 donor cells**. *Nature Medicine*. 2024.

58. Salgado M, Gálvez C, Nijhuis M, Kwon M, Cardozo-Ojeda EF, Badiola J et al. **Dynamics of virological and immunological markers of HIV persistence after allogeneic haematopoietic stem-cell transplantation in the IciStem cohort: a prospective observational cohort study**. *The Lancet HIV*. 2024;11(6):e389.

59. Salgado M, Migueles SA, Yu XG, Martinez-Picado J. **Exceptional, naturally occurring HIV-1 control: Insight into a functional cure**. *Med*. 2024.

60. Sammut SJ, Galson JD, Minter R, Sun B, Chin SF, De Mattos-Arruda L et al. **Predictability of B cell clonal persistence and immunosurveillance in breast cancer**. *Nature Immunology*. 2024;25(5):916.

61. Sisteré-Oró M, Du J, Wortmann DDJ, Filippi MD, Cañas-Ruano E, Arrieta-Aldea I et al. **Pan-pox-specific T-cell responses in HIV-1-infected individuals after JYNNEOS vaccination**. *Journal of Medical Virology*. 2024;96(1):e29317.

62. Tarrés-Freixas F, Clotet B, Carrillo J, Blanco J. **Nucleic Acid Vaccines Encoding Proteins and Virus-like Particles for HIV Prevention**. *Vaccines*. 2024;12(3).

63. Teruel I, Castellà E, Recalde S, Viñas G, Petit A, Trigueros M et al. **Assessing the Prognostic Value of Cytoplasmic and Stromal Caveolin-1 in Early Triple-Negative Breast Cancer Undergoing Neoadjuvant Chemotherapy**. *International Journal of Molecular Sciences*. 2024;25(22).

64. Torán-Monserrat P, Lamonja-Vicente N, Costa-Garrido A, Carrasco-Ribelles LA, Quirant B, Boigues M et al. **SARS-CoV-2 Infection Risk by Vaccine Doses and Prior Infections Over 24 Months: ProHEpiC-19 Longitudinal Study**. *JMIR Public Health and Surveillance*. 2024;10:e56926.

65. Trinité B, Durr E, Pons-Grífols A, O'Donnell G, Aguilar-Gurrieri C, Rodriguez S et al. **VLPs generated by the fusion of RSV-F or hMPV-F glycoprotein to HIV-Gag show improved immunogenicity and neutralizing response in mice**. *Vaccine*. 2024.

66. Ubals M, Nadal-Baron P, Arando M, Rivero Á, Mendoza A, Descalzo Jorro V et al. **Oral linezolid compared with benzathine penicillin G for treatment of early syphilis in adults (Trep-AB Study) in Spain: a prospective, open-label, non-inferiority, randomised controlled trial**. *The Lancet Infectious diseases*. 2024.

67. Usai C, Ainsua-Enrich E, Gales VU, Pradenas E, Lorca-Oró C, Tarrés-Freixas F et al. **Immunisation efficacy of a stabilised SARS-CoV-2 spike glycoprotein in two geriatric animal models**. NPJ Vaccines. 2024;9(1):48.

68. Wang Y, Alcalde-Herraiz M, Güell KL, Chen L, Mateu L, Li C et al. **Refinement of post-COVID condition core symptoms, subtypes, determinants, and health impacts: a cohort study integrating real-world data and patient-reported outcomes**. *EBioMedicine*. 2024;111:105493.

69. Wang Y, Su B, Alcalde-Herraiz M, Barclay NL, Tian Y, Li C et al. **Modifiable lifestyle factors and the risk of post-COVID-19 multisystem sequelae, hospitalization, and death**. *Nature Communications*. 2024;15(1):6363.

70. Xie J, López-Güell K, Dedman D, Duarte-Salles T, Kolde R, López-Blasco R et al. **Incidence of post-acute COVID-19 symptoms across healthcare settings in seven countries: an international retrospective cohort study using routinely-collected data**. *EClinicalMedicine*. 2024;77:102903.

71. Xie J, Mothe B, Alcalde Herraiz M, Li C, Xu Y, Jödicke AM et al. **Relationship between HLA genetic variations, COVID-19 vaccine antibody response, and risk of breakthrough outcomes**. *Nature Communications*. 2024;15(1):4031.

Conference presentations & talks

International congresses

1. **Albó J**, López Plana A, Rodríguez Esteban G, Benítez Rodríguez C, Blanco J, Aguilar Gurrieri C, de la Iglesia N. ***Dendritic cell/naïve CD8+ T cell co-culture to assess neoantigen-specific T cell priming by in silico predicted neoantigen***. *19th ASEICA International Congress*. Zaragoza, Spain. November 13-15, 2024. Poster.

2. **Ávila Nieto C**, Vergara Alert J, Amengual Rigo P, Ainsua Enrich E, Brustolin M, Rodríguez de la Concepción ML, Pedreño López N, Rodón J, Urrea Gales V, Pradenas Saavedra E, Marfil Verchili S, Ballana Guix E, Riveira Muñoz E, Perez M, Roca N, Tarrés Freixas F, Cantero G, Pons Grífols A, Rovirosa Martí C, Aguilar Gurrieri C, Ortiz López R, Barajas Molina A, Trinité B, Lepore R, Muñoz Basagoiti J, Pérez Zsolt D, Izquierdo Useros D, Valencia A, Blanco J, Guallar V, Clotet Sala B, Segalés J, Carrillo J. ***Spike-V987H vaccination protects animal models from SARS-CoV-2-induced severe disease***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

3. Bellmunt J, Hully M, Epstein I, Liria S, Xie Y, Kukreja S, Muñoz M, Garoz P, Fernandez N, **Cabrera Navarro C**, Choueiri T, Long H, Cejas P. ***Combined high resolution H3K27ac epigenomic and single cell transcriptional profiling identifies a signature predictive of response to neoadjuvant immune checkpoint inhibitors (ICI) in Urothelial Cancer (UC)***. *American Society of Clinical Oncology Congress*. Chicago, USA. May 31 - June 4, 2024. Poster.

4. **Benitez Rodriguez C**, Albó Delgado J, Gustavo Rodriguez E, López Plana A, Blanco Arbués J, Aguilar Gurrieri C, De la Iglesia N. ***Identification of human immunogenic neoantigens using in silico prediction coupled to ex vivo functional validation***. *DC2024 17th International Symposium on Dendritic Cells*. Sitges, Spain. October 20-23, 2024. Poster.

5. **Bernad Rosa L**, Perez Caballero R, Kilpelainen A, Romero Martin L, Blanch Lombarte O, Peña Poderós R, Rodríguez Lozano GF, Manresa Dominguez JM, Clotet Sala B, Olvera A, Brander C, Martínez Cáceres E, Violan C, Torán Montserrat P, García Prado J. ***Identification of functional peptide-specific Nsp3, NC and M SARS-CoV-2 T-cell responses in hybrid immunity***. *7th European Congress of Immunology (ECI)*. Dublin, Ireland. September 1-4, 2024. Poster.

6. **Brander C**. *AIDS Vaccine Discovery Congress 2024*. Seattle, USA, February 6-9, 2024. Invited talk.

7. **Cabrero de las Heras S**, Riveira Muñoz E, Felip Salgàs E, Fondelli F, García Vidal E, Climent J, Rueda Martínez A, Perez Venero J, Mesía R, Clotet Sala B, Martínez Cardús A, Margelí M, Ballana Guix E. ***Single-cell monitoring reveals T cell diversity as key to Palbociclib efficacy in advanced breast cancer (InMaM)***. *19th ASEICA International Congress*. Zaragoza, Spain. November 13-15, 2024. Poster.

8. **Casadellà M**, Català F, Elizalde A, Parera M, Borgognone A, Noguera M, Paredes R. ***Impact of Raltegravir Intensification on the Gut Microbiota of People With Chronic HIV-1 Infection***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

9. **Català Moll F**. ***dar: Consensus-based robustness for differential abundance testing in microbiome data analysis***. *EuroBioc 2024*. Oxford, UK. September 4-6, 2024. Poster.

10. Chafino S, Nevot M, Loste C, Muñoz Lopez F, Lladós G, López C, Santos JR, Clotet Sala B, Paredes R, Vidal F, Peraire J, Mateu L, Rull A, **Massanella M**. ***Unraveling the Molecular Signature of Long COVID with Post-Exertional Fatigue: An Analysis of Circulating Proteomic and Metabolomic Profiles***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Oral presentation.

11. **De la Iglesia N**. ***Development of neoantigen-based vaccines in melanoma and beyond***. *VII Annual Translational Meeting on Melanoma Research 2024*. Barcelona, Spain. March 1, 2024. Invited talk.

12. **España S**, Loste C, Lladós G, Santos JR, Dulsat G, Garcia A, Carabia J, Ancochea A, Chamorro A, San José A, Abad E, Muñoz Moreno JA, Prats A, Carmezim Correia JP, Tebe C, Fumaz C, Coll R, Estany C, Puig J, Clotet Sala B, Massanella M, Paredes R, Mateu L. ***Exploring the Efficacy of Plasma Exchange Therapy in Post- COVID-19 Condition: A Pilot Randomized Double-Blind Trial***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Oral presentation.

13. Fortea M, **Puertas MC**, Urrea V, Cherubini M, Bayón Gil A, Resa Infante P, Piñol Jurado P, Bernabeu M, Haase K, Martínez Picado J. ***Exploring Endothelial Dysfunction led by proinflammatory cytokines in COVID-19: Insights from 3D Lung Microvessels On-Chip***. *Viral Infections & Inflammation Workshop 2024*. Online. September 26-27, 2024. Oral presentation.

14. **Fumaz C**, Ornelas A, Chamorro A, Estany C, Lladós G, López C, Loste C, Massanella M, Muñoz Moreno JA, Prats A, Santos JR, Paredes R, Mateu L. ***Social and emotional characteristics of people living with Long COVID in Catalonia, Spain***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Poster.

15. **Gallego Cortes A**, Sánchez Gaona N, García Prado J. ***HIV Infection and Reactivation Heterogeneity in Tonsillar and Intestinal Models of HIV Persistence***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

16. García Vidal E, **Calba Iñiguez I**, Riveira Muñoz E, Garcia Rodríguez E, Clotet Sala B, Cabrera Navarro C, Ballana Guix E, Badia Corcoles R. ***Harnessing the innate immune response through NOD1 agonists prevents SARS-CoV-2 infection in human lung epithelial cells***. *Viruses 2024 - A World of Viruses*. Barcelona, Spain. February 14-16, 2024. Poster.

García Vidal E, Calba Iñiguez I, Riveira Muñoz E, Garcia Rodríguez E, Clotet Sala B, Cabrera Navarro C, Ballana Guix E, Badia Corcoles R. ***Innate Immune Response Through NOD1 Agonists Prevents SARS-CoV-2 Infection in Lung Epithelial Cells***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

17. **García Vidal E**, Ezeonwumelu I, Badia Corcoles R, Riveira Muñoz E, Oriol Tordera B, Clotet Sala B, Ballana Guix E. ***The identification of novel cellular targets for***

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a HIV-1 cure through non-clonal latency models from myeloid and lymphoid origin. *Viruses 2024 - A World of Viruses*. Barcelona, Spain. February 14-16, 2024. Poster.

18. **García Vidal E**, Felip Falgàs E, Cabrero de las Heras S, Bernat Peguera A, Cirauqui B, Teruel I, Fernando A, Pous A, Lopez A, Boronat Marga R, Mesía R, Fernandez PL, Clotet Sala B, Riveira Muñoz E, Martinez Cardus A, Ballana Guix E, Margelí M. ***Identification of a 9-immune gene signature associated to CDK4/6i clinical efficacy in HR+HER2- breast cancer***. *19th ASEICA International Congress*. Zaragoza, Spain. November 13-15, 2024. Poster.

19. **Garrido Sanz L**, Soriaga L, Wong E, Puertas MC, Dalmau J, Coll P, Mothe B, Clotet B, Telenti A, Martínez Picado J, Morón López S. ***Optimizing detection on HIV-1 infected cells a novel bioinformatics pipeline leveraging KRAKEN2 for single-cell multiomics datasets***. *11th International Workshop on HIV Persistence during Therapy*. Florida, USA. December 10-13, 2024. Poster.

20. **González Navarro I**, Mothe B, Martínez Picado J. T***aming the Viral Reservoir Over 3 Decades of Advancements in HIV Treatment***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

21. Herrero P, Cabrera Navarro C, **Julian E**. ***Implications of ageing on cancer immunotherapy treatment using micobacteria***. *34th ECCMID*. Barcelona, Spain. March 27-30, 2024. Poster.

22. Herrero P, Pagès Oliveras J, Cabrera Navarro C, **Julian E**. ***Impact of ageing on the immunotherapy effect of mycobacteria against bladder cancer***. *International Workshop Microbes & Cancer: Unravelling the Connection for Innovative Therapies*. Madrid, Spain. June 13-14, 2024. Poster.

23. **Izquierdo Pujol J**, Morón López S, Martínez Picado J, Urrea Gales V, Dalmau J, González Aumatell A, Carreras Abad C, Méndez M, Rodrigo C, Blanco J, Carrillo J, Martínez Picado J. ***Long COVID in Children Is Associated With Lower Anti-RBD IgG/IgA and Neutralizing Antibody Levels***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

24. **Laguía F**, Chojnacki J, Erkizia I, Geli M, Enric C, Resa Infante P, Martínez Picado J. ***Massive endocytosis mechanisms are involved in CD169-Mediated uptake of HIV-1 by dendritic cells***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

25. **Lázaro Díez M**, Marín López M, Casella V, Bernad Rosa L, Vehí Piqué E, Peña Poderós R, Rodríguez Lozano GF, Martín Gayo E, Meyerhans A, García Prado J. ***Dual blockade with alpha-PD-L1 and alpha-TIGIT antibodies restores immune activation on dendritic cells and T-cells during LCMV chronic infection***. *7th European Congress of Immunology (ECI)*. Dublin, Ireland. September 1-4, 2024. Poster.

26. **Lopez C**, Loste C, Lladós G, Santos JR, Muñoz Lopez F, Chamorro A, Herrero C, Casares P, Garcia A, Caballero E, Amarilla C, Muñoz Moreno JA, Prats A, Fumaz C, Paredes R, Massanella M, Mateu L. ***Impact of Reinfections in Long COVID patients***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Poster.

27. **Martínez Picado J**. ***Exploring the neurobiological underpinnings of long COVID-related cognitive impairment - NeuroCOVID study***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Oral presentation.

28. **Martínez Picado J**. ***Plasma biomarkers in children and young people with long-COVID***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Oral presentation.

29. **Molina Molina E**, Perez Zsolt D, Bech-Serra JJ, Riviera Muñoz E, Garcia Vidal E, Franco Trepat E, Franco S, Raïch Regué D, Erkizia I, Carrillo J, Blanco J, Losada A, Aviles P, Cuevas C, Vergara Alert J, Segalés J, Martínez MA, Paredes R, Clotet B, Ballana E, De la Torre C, Izquierdo Useros N. ***Plitidepsin broadly inhibits protein synthesis of distant viruses while reprograming the translational cellular landscape as a homeostatic response***. *37th International Conference on Antiviral Research*. Cold Coast, Australia. May 20-24, 2024. Poster.

30. **Muñoz Lopez F**, Loste C, Lladós G, Santos JR, Lopez C, Quirant B, Martínez Cáceres E, Paredes R, Clotet Sala B, Mateu L, Massanella M. ***Long COVID Immune and Metabolic Imbalance: Findings from Comprehensive Standardized Clinical Testing***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Poster.

31. **Muñoz Moreno JA**, Prats A, Larrañaga I, Echeverria P, Puig J, Malagrida R, Valero P, Davins M, Massanella M, Mateu L. ***SuperCAP Study: A Clinical Trial Tes5ng a Distance Cogni5ve Program for Post-COVID Condi5on Based on Pa5ents' Experience***. *Demystifying Long COVID international Conference 2024*. Barcelona, Spain. November 21-22, 2024. Poster.

32. **Pedreño López N**, Tarrés Freixas F, Usai C, Ainsua Enrich E, Benet S, Carabelli J, Pradenas Saavedra E, Ávila Nieto C, Roca N, Cantero G, Perez M, Rodríguez de la Concepción ML, Raïch Regué D, Revollo B, Hernández A, Abad Capa J, Mothe B, Massanella M, Izquierdo Useros N, Blanco J, Clotet Sala B, Segalés J, Vergara Alert J, Carrillo J. ***High levels of S2-specific IgA antibodies with decreased Fc-effector activity correlate with severe COVID-19***. *7th European Congress of Immunology (ECI)*. Dublin, Ireland. September 1-4, 2024. Poster.

33. **Pérez Caballero R**, Bernad Rosa L, Kilpelainen A, Blanch Lombarte O, Romero Marín L, Peña Poderós R, Rodríguez Lozano GF, Manresa Dominguez JM, Clotet Sala B, Olvera van der Stoep A, Brander C, Martínez Cáceres E, Violan C, Torán Montserrat P, García Prado J. ***Long-term immunodominant profile of SARS-COV-2 T-cell responses in hybrid immunity***. *31st Conference on Retroviruses and Opportunistic Infections CROI*. Denver, USA. March 3-6, 2024. Poster.

34. **Prats A**, Moreno Muñoz JA, Fumaz C, Loste C, Lladós G, López C, Santos JR, Chamorro A, Paredes R, Massanella M, Mateu L. ***Evolution of Neuropsychological Symptoms and Disabilityin a Cohort of Individuals With Long COVID and Cognitive Complaints: The KING-COG Study***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Poster.

35. **Puertas MC**, Martí Sarrias A, Garcia Gonzalez L, Turpin I, Bayón Gil A, Piñol Jurado P, Resa Infante P, Acosta S, Martínez

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Picado J. ***Modelling Post-acute COVID-19 neuropathogenesis in human brain organoids***. *Viral Infections & Inflammation Workshop 2024*. Online. September 26-27, 2024. Oral presentation.

36. Puertas MC, Prats A, Grau Rivera O, López C, Minguillón C, Suárez Calvet M, Muñoz Moreno J, Mateu L, Navarro A, Martínez Picado J, **Massanella M**. ***Exploring the Neurobiological Underpinnings of Long COVID-Related Cognitive Impairment - NEUROCOVID study***. *Demystifying Long COVID International Conference 2024*. Barcelona, Spain. 21-22 November, 2024. Poster.

37. **Raïch Regué D**, Pérez Zsolt D, Erkizia I, Molina Molina E, Franco Franco S, Izquierdo Useros N. ***Testing clinically approved drugs with potential to inhibit mpox virus infection in dendritic cells***. *17th International Symposium on Dendritic Cells*. Sitges, Spain. October 20-23, 2024. Poster.

38. **Resa Infante P**, Erkizia I, Muñiz Trabadua X, Linty F, Bentlage A, Pérez Zsolt D, Muñoz Basagoiti J, Raïch Regué D, Izquierdo Useros N, Rispens T, Vidarsson G, Martínez Picado J. ***Preclinical development of humanized monoclonal antibodies against CD169 as a broad antiviral therapeutic strategy***. *17th International Symposium on Dendritic Cells*. Sitges, Spain, October 20-23, 2024. Poster.

39. **Riera Sans L**, De Cambra S, Alarcon Soto Y, Blanco J, Carrillo J, Izquierdo Useros N, Plana M, García Prado J, Penafreta A, Mothe B. ***Safety and reactogenicity of a receptor binding domain (RBD) based vaccine against SARS-CoV-2 in individuals with immunosuppressive conditions***. *18th Vaccine Congress*. Lisbon, Portugal. September 8-11, 2024. Poster.

40. **Rodríguez de la Concepción ML**, Pedreño López N, Carabelli J, Ainsua Enrich E, Rovirosa Martí C, Ávila Nieto C, Aguilar Gurrieri C, Cunyat Viaplana F, Pradenas Saavedra E, Marfil Verchili S, Molinos Albert L, Tarrés Freixas F, Clotet Sala B, Blanco J, Carrillo J. ***Identification of non-neutralizing antibodies that compete with CD4 binding siteneutralizing antibodies in HIV infection***. *5th HIV Research for Prevention Conference (HIVR4P 2024)*. October 6-10, 2024. Lima, Perú. Oral presentation.

41. Servian P, Buisan O, Pedreño Lopez S, Pagès Oliveras J, Urrea V, Martínez R, García Rodríguez E, Areal J, Amat M, **Cabrera Navarro C**. ***RUTIVAC-1 Study: A Randomized, Double-Blind, Placebo-Controlled Phase I Trial to Evaluate the Immunomodulatory Effect of RUTI® in Individuals with High-Risk Non-Muscle-Invasive Bladder Cancer Treated with Intravesical BCG***. *International Workshop Microbes & Cancer: Unravelling the Connection for Innovative Therapies*. Madrid, Spain. June 13-14, 2024. Poster.

42. **Servian P**, Pedreño Lopez S, Pagès Oliveras J, Urrea Gales V, Martínez R, García Rodríguez E, Areal J, Amat M, Cabrera Navarro C. ***RUTIVAC-1 Study: A Randomized, Double-Blind, Placebo-Controlled Phase I Trial to Evaluate the Immunomodulatory Effect of RUTI® in Individuals with High-Risk Non-Muscle-Invasive Bladder Cancer Treated with Intravesical BCG***. *European Society for Medical Oncology ESMO Congress 2024*. Barcelona, Spain. September 13-17, 2024. Poster.

43. **Trigueros Peña M**, Martínez A, Puig J, Nevot M, Muñoz López F, Loste C, Fernández MA, Kharraz Y, González Alonso S, Carrillo J, Blanco J, Negredo E, Massanella M. ***Deep phenotyping of immune cell populations in older PWH identifies a persistent immune dysfunction***. *AIDS 2024*. Munich, Germany. July 20-26, 2024. Poster.

44. **Vehí Piqué E**, Lázaro Díez M, Lázaro Gorines R, Peña Poderós R, Carolis C, Domínguez Alonso C, Álvarez Vallina A, García Prado J. ***A small bispecific antibody induces HIV-1 Env-specific T-cell activation***. *7th European Congress of Immunology (ECI)*. Dublin, Ireland. September 1-4, 2024. Poster.

National congresses

1. **Aguilar Gurrieri C**. ***Novel VLP platform for neoantigen-based melanoma vaccines***. *CMCiB Symposium: 5 years enabling pioneering research*. Barcelona, Spain. July 9, 2024. Oral presentation.

2. **Aparicio Prats E**, Raïch Regué D, **Pradenas Saavedra E**, Boreika R, Marfil S, Erkizia I, Pidkova T, Franco Trepat E, Molina Molina E, Alarcón Soto Y, Benet S, Carrillo J, Ferrer L, García Prado J, Mothe B, Izquierdo Useros N, Trinité B, Blanco J. ***Humoral immune responses to the recombinant RBD-based PHH-1V COVID-19 vaccine in PWH***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

3. **Ávila Nieto C**, Vergara Alert J, Amengual Rico P, Ainsua Enrich E, Brustolin M, Rodríguez de la Concepción ML, Pedreño López N, Rodón J, Urrea Gales V, Pradenas Saavedra E, Marfil Verchili S, Ballana Guix E, Riveira Muñoz E, Perez M, Roca N, Tarrés Freixas F, Pons Grífols A, Rovirosa Martí C, Aguilar Gurrieri C, Ortiz López R, Barajas Molina A, Trinité B, Lepore R, Muñoz Basagoiti J, Pérez Zsolt D, Izquierdo Useros N, Valencia A, Blanco J, Guallar V, Clotet Sala B, Segalés J, Carrillo J. ***Novel SARS-COV-2-stabilized Spike proteins with improved production and protective activity against SARS-COV-2-induced disease in animal models***. *44 Congreso de la Sociedad Española de Inmunología*. Bilbao, Spain. January 13, 2024. Poster.

4. Bernad Rosa L, Pérez Caballero R, **Esteban I**, Aurrecoechea E, Pomarol R, Alarcon Soto Y, Cañete M, Peña Poderós R, Cavero Martínez S, Benet S, Soriano A, Castro A, Izquierdo Useros N, Blanco J, Carrillo J, Prenafeta A, Ferrer L, Mothe B, Plana M, García Prado J. ***Cellular immune responses to the recombinant RBD protein-based PHH-1V COVID-19 vaccine in PWH***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

5. **Buisan O**, Senserrich Velasco J, Servian P, Sanchez M, García Rodríguez E, Pagès Oliveras J, Freixas R, Colomer A, Cervera J, Ferreiro C, Vigues F, Areal J, Clotet Sala B, Bellmunt J, Cabrera Navarro C. ***CD39 as a predictive biomarker of response to neoadjuvant therapy in muscle-invasive bladder cancer patients***. *XXXVII Reunión Nacional del Grupo de Urología Oncológica*. Santander, Spain. April 25-26, 2024. Oral presentation.

6. **Franco S**, Trigueros Peña M, Palacín D, Bonet Simó JM, Isnard MdM, Mateu L, Prat N, Massanella M, Martínez de la Sierra MA. ***MMS19 and IFIH1 Host genetic variants associate with SARS-CoV-2 infection in elderly residents of long-term care facilities***. *XXIII Jornada de Virologia*. Barcelona, Spain. November 12, 2024. Oral presentation.

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7. **Franco Trepat E**, Bech Serra JJ, Molina Molina E, Jarne I, Perez Zsolt D, Badia R, Riveira Muñoz E, García Vidal E, Revilla L, Franco S, Tarrés Freixas F, Roca N, Ceada G, Kochanowski K, Raïch Regué D, Erkizia I, Boreika R, E Bordoy A, Soler L, Guil S, Carrillo Molina J, Blanco J, Martínez de la Sierra MA, Paredes R, Losada A, Avilés P, Cuevas C, Vergara Alert J, Segalés J, Clotet Sala B, Ballana E, de la Torre C, Izquierdo Useros N. ***Novel antiviral strategy: targeting eEF1A successfully blocks cap-dependent & IRES-dependent viral replication***. *XXIII Jornada Virología - Virology Meeting 2024*. Barcelona, Spain. November 12, 2024. Oral presentation.

8. **Garrido Sanz L**, Soriaga L, Wong E, Puertas MC, Dalmau J, Coll P, Mothe B, Clotet Sala B, Telenti A, Martínez Picado J, Morón López S. ***Optimizing detection of HIV-1 infected cells a novel bioinformatics pipeline leveraging KRAKEN2 for single-cell multiomics datasets***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

9. **González Navarro I**, **Lorenzo Redondo L**, Garrido Sanz L, Salgado Bernal M, Urrea Gales V, Gálvez Celada C, Martínez Picado J. ***HIV-1-infected individuals with extremely low reservoir on ART are characterized by reduced viral diversity and higher hypermutations levels in their viral reservoirs***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

10. **Izquierdo Useros N**. ***Bitter-Sweet viral interactions with Dendritic Cells: Deciphering key receptors involved in viral recognition***. *Winter Meeting Catalan Society of Immunology*. Barcelona, Spain. January 25, 2024. Invited talk.

11. **Laguía F**, Chojnacki J, Erkizia I, Geli M, Enric C, Resa Infante P, Martínez Picado J. ***Enveloped viruses take advantage of Massive Endocytosis mechanisms in CD169-mediated uptake in Dendritic Cells***. *Viruses 2024 - A World of Viruses*. Barcelona, Spain. February 13-16, 2024. Poster.

12. **Lázaro Díez M**, Vehí Piqué E, Ghanizada M, Peña Poderós R, Guerrero D, Cabrera C, Rogríguez Lozano GF, Kloverpris H, García Prado J. ***Development of a 3R tonsil organoids platform to evaluate HIV-1 cure therapeutics***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

13. **Pons Grifols A**, Guinot FJ, Marfil S, Rovirosa C, Valenzuela A, Muñoz MA, Ruiz Mateos E, Trinité B, Pernas M, Casado C, Blanco J. ***Functional characterization of HIV-1 envelope glycoproteins isolated from the elite controller cohort***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

14. **Pons Grifols A**, Pradenas Saavedra E, Aparicio Prats E, Frances S, Guinot FJ, Vera M, del Romero J, Ruiz Mateos E, Trinité B, Pernas M, Csado C, Blanco J. ***Longitudinal characterization of the humoral response of an HIV-1 exceptional elite controller losing control 32 years after diagnosis***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Oral presentation.

15. **Resa Infante P**, Erkizia I, Muñiz Trabadua X, Linty F, Bentlage A, Pérez Zsolt D, Muñoz Basagoiti J, Raïch Regué D, Izquierdo Useros N, Rispens T, Vidarsson G, Martínez Picado J. ***Preclinical development of humanized monoclonal antibodies against CD169 as a broad antiviral therapeutic strategy***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

16. Sánchez Cerrillo I, Tsukalov I, Agudo Lera M, Popova O, Fuentes P, Alcain J, Garcia Fraile L, de los Santos I, Lázaro Diez M, Grau Expósito J, Sanchez Gaona N, Vrbanac V, Toribio ML, Sanchez Madrid F, Garcia Prado J, Genescà M, Buzón MJ, Martin Gayo E. ***Combination of antiretroviral treatment with blockade of TIGIT and/or KLRG1 differentialy associates with memory NK and CD8+ T cells protection in HIV-1 infected humanized mice***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Oral presentation.

17. **Trigueros M**, Loste C, Muñoz Lopez F, Urrea V, Martínez A, González S, Puig J, Martin M, Bonjoch A, Echevarria P, Massanella M, Negredo E. ***Immunoaging at an early age is associated with a higher comorbidity burden in people with HIV on ART***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Poster.

18. **Vives Adrián L**, Malagrida R. ***Design of systemic, collaborative and decentralized interventions for more effective mental health promotion in schools***. *Congreso Anual Sociedad Española de Epidemiología*. Cádiz, Spain. September 11-13, 2024. Oral presentation.

19. **Vehí Piqué E**, Lázaro Díez M, Lázaro Gorines R, Peña Poderós R, Carolis C, Domínguez Alonso Carmen, Álvarez Vallina Luis, García Prado J. ***HIV-1 Env specific T-Cell activation mediated by mRNA lightweight bispecific antibody***. *XV Congreso Nacional GeSIDA*. Zaragoza, Spain. November 24-27, 2024. Plenary.


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