Doctoral programme Yielding Novel Advancements in Medicine and Innovative Solutions

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RL1. Multimodal artificial intelligence to predict immunotherapy outcomes in triple-negative breast cancer

Key words: immunotherapy; radiology; AI; genomics; computer vision; bioinformatics.

Abstract: Triple-negative breast cancer (TNBC) is an aggressive subtype where only a subset of patients benefits from immune checkpoint therapies (ICT). As ICT adds toxicity & cost, predicting responders remains an unmet need. This project aims to build artificial intelligence models that integrate mammography, gene expression, and immune profiling data to predict ICT efficacy in TNBC. Gene expression assays are already used in breast cancer care, and Dr. Prat has developed clinically validated TNBC-specific tools. Dr. Walle has developed AI models predicting ICT response from immune cell states in blood and brings expertise in machine learning for single cell and bulk data. Mammography, a standard imaging modality, captures submillimeter tumor architecture and correlates with immune infiltration and treatment response. Combining these distinct sources of information promise enhanced identification of patients benefitting from ICT. The candidate will develop and benchmark multimodal AI models including model fusion, graph-based fusion, and transformer-based architectures. Integrating routine clinical lab values collected during therapy will allow dynamic, time-updated predictions of response. Thanks to the combined computational and clinical expertise and the huge corpus of available training date, the resulting models can be easily translated to directly impact clinical decision-making, reduce ICT-associated risks, and personalize therapy for early-stage TNBC patients.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Thomas Walle (walle@recerca.clinic.cat) Computational Cancer Biomedicine (Dr. Walle Group)	Dr. Aleix Prat (alprat@clinic.cat) Translational genomics and targeted therapies in solid tumours (Dr. Prat Group)

About the co-supervision: The group of Dr. Walle aims to build new intelligent diagnostics for cancer patients, supported by access to high-performance computing resources at the Barcelona Supercomputing Center. The group has strong expertise in machine learning, single-cell genomics, and AI model development. Dr. Prat is the director of the Comprehensive Cancer Center and has extensive experience in clinical research, molecular profiling, and breast cancer prognosis through large patient cohorts and his spin-out company RevealGenomics. Together, the supervisors provide complementary expertise spanning computational modelling and clinical application. Dr. Walle and Dr. Prat are highly committed to supporting young researchers, offering a rich interdisciplinary environment that integrates advanced data science with clinical impact in cancer research.

Examples of secondments opportunities: Helmholtz Munich (Germany, Europe).

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RL2. Development of genetic therapies to target immunosuppressive cancer-associated fibroblasts

Key words: Tumor microenvironment; Immunosuppression; Cancer-associated fibroblasts; Spatial -omics; Preclinical Models; Targeted therapies.

Abstract: With this research line we aim to decipher the emergence and evolution of immunosuppressive cancer-associated fibroblasts (CAFs) in solid tumors, using intrahepatic cholangiocarcinoma as a starting point to understand how CAFs participate in resistance to therapy to develop new genetic-based strategies for their targeting. By integrating cutting-edge experimental models, high-resolution multi-omics profiling and clinically annotated patient datasets, we will investigate the cellular origins, molecular trajectories, and immunomodulatory functions of CAFs. This interdisciplinary strategy enables the identification of key drivers of CAF-mediated immune evasion and therapy resistance to be genetically targeted using innovative experimental models and technologies under development in our laboratory. This research line seeks to uncover novel therapeutic targets and inform the rational design of combination strategies that effectively disrupt CAF-driven immunosuppression, thereby enhancing treatment efficacy and patient outcomes.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Silvia Affò (saffo@recerca.clinic.cat) Tumor microenvironment plasticity and heterogeneity (TMHet) (Dr. Affò Group)	Dr. Alejandro Forner (aforner@clinic.cat) Hepatic oncology (BCLC) (Dr. Reig Group)

About the co-supervision: The hosting groups provide a complementary and translational environment. Dr. Affò's lab studies CAF plasticity and tumor microenvironment heterogeneity using advanced models and omics technologies, while Dr. Forner's group leads international clinical research on liver cancer detection and treatment response. Together, they offer interdisciplinary training, networking opportunities, and exposure to real clinical challenges. Dr. Affò and Dr. Forner contribute complementary expertise aligned with key priorities in cholangiocarcinoma research. The co-supervision approach includes joint meetings, shared decision-making, and integrated training, ensuring a strong translational workflow.

Examples of secondments opportunities: Mount Sinai and Columbia University (New York, US); University of Edinburgh and University of Glasgow (UK, Europe); DKFZ (Germany, Europe).

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RL3. Translational Vascular Cell Biology in genetic aortopathies of the connective tissue

Key words: Marfan syndrome; Williams syndrome; aorta; cell signaling; oxidative stress; imaging.

Abstract: We have provided insights in the redox stress contribution to the development and progression of opposed aortopathies occurring in Marfan syndrome (MFS) and Williams-Beuren syndrome (WBS), which respectively lead to aortic aneurysm and stenosis. We reported the involvement of NADPH oxidase 4 (NOX4) and xanthine oxidoreductase (XOR). We reported that allopurinol, a specific inhibitor of XOR and usually administered to patients to treat the gout, strongly prevented the progression of the aneurysm in a mouse model of MFS. In comparison with current pharmacological approaches to human patients, the advantages of administrating allopurinol are greater than losartan because it is safer, more economical, and could be administered during pregnancy. These advantages have been recognized by EMA and allopurinol has been approved as an orphan drug for treatment of MFS. This has opened the door to explore a European multinational clinical trial in the context of VASCERN clinical groups. In our lab, we are also comparatively assaying the combinatory use of losartan, allopurinol and other antioxidants to interfere in the progression not only of the aneurysm in MFS but also in the aortic stenosis and hypertension that happens in WBS. Dr. Victoria Campuzano, a R3 member of the group, has generated a mouse model of the disease (CD), and preliminary results indicate that allopurinol also reverts characteristic hypertension and cardiovascular injuries of this disease.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Gustavo Egea (gegea@ub.edu)	Dr. Aleksandra Mas-Stachurska (amas-sta@clinic.cat)
Vascular cell biology (Dr. Egea Group)	Cardiac imaging (Dr. Sitges Group)

About the co-supervision: The Vascular Cell Biology Laboratory, led by Dr. G. Egea and Dr. V. Campuzano, focuses on the study of redox stress in cardiovascular injury in Marfan syndrome (MFS) and Williams–Beuren syndrome (WBS), respectively. The research strategy integrates imaging, biochemical, and molecular approaches to address fundamental questions, with a clear emphasis on translating findings into clinical practice. In this context, the involvement of Dr. Mas-Stachurska brings a valuable clinical perspective to the research, both conceptually and experimentally through work with mouse models. The PhD candidate will actively participate in experimental work within the laboratory while also gaining clinical insight by attending weekly cardiology seminars and observing clinical practice alongside Dr. Mas-Stachurska.

Examples of secondments opportunities University of Antwerp (Belgium, Europe).

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RL4. New SOX11-targeting PROTACs for the Treatment of Cancers

Key words: SOX11-adicted cancers (MCL, BL, DCIS breast cancer, mHNPC prostate cancer); PROteolysis-TArgeting Chimeras (PROTAC) against SOX11.

Abstract: PROteolysis TArgeting Chimera (PROTAC) is an emerging therapeutic strategy, enabling selective degradation of target proteins through the ubiquitin–proteasome system. SOX11 is an embryonic transcription factor aberrantly expressed in several aggressive malignancies, where it plays a key oncogenic role by promoting cell survival, metastasis, stemness, and therapy resistance. Its pluripotency activity and contribution to tumor progression have been demonstrated in both solid tumors (breast, glioma, bladder, and prostate cancer) and hematological malignancies (MCL, BL and ALL). Since SOX11 is largely absent from normal adult tissues, its targeting represents a tumor specific strategy with the potential to enhance efficacy while minimizing toxicity. However, not clinically effective SOX11 inhibitors currently exist. The main objective of our project is to develop SOX11 specific PROTAC degraders as a first in class targeted therapy for patients with SOX11 overexpressing tumors, including aggressive MCL, pediatric BL, and breast and prostate cancers. We will generate proof of concept for SOX11 degradation using classical small molecule PROTACs based on newly identified SOX11 binders and SOX11–SMARCA4 interaction interfaces. The project will assess in vitro and in vivo anti tumor efficacy and explore combinatorial strategies to overcome therapy resistance, advancing the translational and valorization potential of SOX11 targeted PROTACs.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Virginia Amador (vamador@recerca.clinic.cat) Functional characterization of oncogenic mechanisms in lymphomagenesis (Dr. Amador Group)	Dr. Blanca González (mbgonzal@clinic.cat) Translational genomics and targeted therapies in solid tumours (Dr. Prat Group)

About the co-supervision: The team brings together complementary expertise across basic and clinical research, including wet lab scientists and pathologists specialized in SOX11-overexpressing cancers and targeted therapy development. Dr. Amador, as principal supervisor, will lead project design, management, and the development of SOX11-targeted PROTACs and experimental models. Dr. González will provide clinical pathology expertise, well-characterized samples, and analysis of tumor dissemination in PDX models. Together, they ensure strong translational alignment with clinical needs and collaboration with industrial partners, offering the candidate an integrated and clinically relevant research environment.

Examples of secondments opportunities: Columbia University (New York, US); Karolinska Institute (Sweden, Europe).

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RL5. Tumor cell and microenvironment drivers of progression and therapy resistance in aggressive lymphoid neoplasms

Key words: Lymphoma; tumor progression; tumor microenvironment; single cell analysis; therapy resistance; immunotherapy.

Abstract: Mantle cell lymphoma (MCL) and transformed chronic lymphocytic leukemia (Richter transformation) are aggressive lymphoid neoplasms whose clinical evolution is heterogeneous. MCL follows different trajectories from very aggressive requiring immediate and intense treatment to an indolent disease that may be managed conservatively for long periods. Novel agents and immunotherapy strategies are improving outcomes, but the failure of therapy in some patients and the development of resistance constitute major unresolved constraints. Most molecular and genomic studies in these neoplasms have focused on the bulk analysis of tumor cells at diagnosis, with limited information on the complex tumor microenvironment (TME). In this project, we propose to understand the mechanisms driving the progression and therapy resistance in these tumors. We will use single-cell whole genome/transcriptome sequencing in longitudinal samples following different clinical courses to identify specific tumor cell states, timing of driver mutations and subclonal dynamics determining tumor evolution. The simultaneous investigation of the TME cell complexity and its interactions with tumor cells will provide an integrated perspective of the tumor ecosystem. The comparison of tumors that responded with those that were refractory or relapsed to novel targeted agents and immunotherapy will provide clues to identify biomarkers of response and novel vulnerabilities to overcome the failure of these strategies.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Ferran Nadeu (nadeu@recerca.clinic.cat)	Dr. Manel Juan (mjuan@clinic.cat)
Molecular pathology of lymphoid neoplasms (Dr. Campo Group)	Immunogenetics of the autoinflammatory response (Dr. Juan Group)

About the co-supervision: The research groups integrate complementary expertise across basic and clinical research, bringing together pathologists, molecular and cell biologists, and bioinformaticians within the IDIBAPS Lymphoid Neoplasm Multidisciplinary Program. Dr. Campo's group has generated large-scale genomic data on several lymphoid neoplasms and their clinical implications and therefore provides expertise in the biological and clinical interpretation of genomic alterations in this specific disease context. Dr. Juan's group contributes with immunological expertise to interpret the complex tumor microenvironment and its interactions with tumor cells, conducts functional studies to validate descriptive findings, and explores their implications for novel immunotherapy strategies. Together, this co-supervision team offers a strong translational framework that integrates genomic,

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computational, and immunological approaches to advance the understanding and treatment of lymphoid neoplasms.

Examples of secondments opportunities: German Cancer Research Center (Germany, Europe); Center for Immunology of Marseille-Luminy (France, Europe).

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RL6. Decoding Learning and Sleep in Autoimmune Encephalitis: From Brain Circuits in Animal Models to Human Mechanisms through Computational Neuroscience

Key words: Autoimmune encephalitis; systems neuroscience; deep phenotyping; human and animal models; sleep; learning.

Abstract: Autoimmune encephalitis (AE) are severe neurological disorders marked by cognitive deficits, behavioral changes, seizures, and sleep disturbances. NMDAR and LGI1 encephalitis, the most frequent forms, are caused by autoantibodies targeting synaptic proteins, leading to neuronal dysfunction, memory and learning deficits, and disrupted sleep. The specific brain circuits underlying these deficits, and how altered sleep contributes to cognitive impairment, remain poorly understood. LGI1 encephalitis mainly affects the limbic system, critical for memory and learning, while NMDAR encephalitis is more widespread, often accompanied by movement disorders and psychiatric symptoms, suggesting basal ganglia and frontal cortex involvement. Sleep disturbances include insomnia, REM sleep behavior disorder, and fragmented slow-wave sleep, yet the underlying circuits are unexplored. We propose an interdisciplinary project to map the neural circuits of learning, memory, and sleep in NMDAR and LGI1 encephalitis. Using active immunization mouse models, we will employ automated cognitive training, computational modeling, video tracking, behavioral segmentation, and wireless sleep monitoring to identify circuit-specific dysfunctions. Optogenetics will interrogate connectivity and function. Findings will be translated to patients through behavioral tasks and sleep assessments to reveal whether similar circuits are disrupted in humans and to elucidate the interplay between sleep and learning in AE.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Marianna Spatola (spatola@recerca.clinic.cat) Neuro-Immune Crosstalk in Brain Infections and Autoimmunity (ImmuBRAIN) (Dr. Spatola Group)	Dr. Hernando Martínez (hmartinez@recerca.clinic.cat) Cortical circuit dynamics (Dr. De la Rocha Group)

About the co-supervision: The groups of Dr. Spatola and Dr. Martinez provide a complementary and highly interdisciplinary research environment, combining translational neuroimmunology and systems neuroscience. Dr. Spatola's lab integrates clinical and experimental approaches to study autoimmune encephalitis using animal models and human studies, while Dr. Martinez's group focuses on behavioral neuroscience, computational analysis, and neural circuit manipulation. Both supervisors are fully committed to a 50–50 co-supervision, with regular joint and weekly meetings to ensure close guidance. The student will work across both labs from the beginning, gaining expertise in immunological, behavioral, and computational approaches.

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Examples of secondments opportunities: Netherlands Institute of Neuroscience (Netherlands, Europe).

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RL7. Decoding the peripheral immune system in chronic liver disease

Key words: Immunity; host defense responses against pathogens; infections; neutrophils; organ failures.

Abstract: Our group investigates the cellular and molecular mechanisms underlying the inadequate immune response in patients with chronic liver disease, who exhibit a disproportionate systemic hyperinflammatory response accompanied by immunosuppression. These alterations have detrimental effects on these patients, rendering them, for example, more susceptible to recurrent infections. This research line will investigate the molecular mechanisms responsible for the presence of neutrophilia accompanied by lymphopenia in the systemic circulation in patients with advanced liver disease. In addition, the research line will investigate whether the systemic immune alterations have their origin in an abnormal functionality of the bone marrow.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Joan Clària (jclaria@clinic.cat) Inflammation and liver disease (Dr. Clària Group)	Dr. Javier Fernández (jfdez@clinic.cat) Chronic liver diseases: molecular mechanisms and clinical consequences (Dr. Ginès Group)

About the co-supervision: The groups involved in this co-supervision team are multidisciplinary and complementary, providing a translational environment that integrates basic and clinical research in liver disease. Dr. Clària's group, based at IDIBAPS, focuses on inflammation and liver disease and includes technicians, predoctoral and postdoctoral researchers with strong expertise in -omics, molecular and cell biology, and experimental models. Dr. Fernández's group has a strong clinical orientation and is composed of clinician scientists and nurses, under the leadership of the head of the Liver ICU (Intensive Care Unit) at Hospital Clínic Barcelona. Supervision will be structured such that Dr. Clària oversees the experimental work, providing guidance on experimental design and translational studies, while Dr. Fernández contributes clinical expertise in advanced liver disease, patient management, and unmet clinical needs.

Examples of secondments opportunities: University of Munster (Germany, Europe); Hôpital Beaujon, INSERM (Paris, France, Europe); KU Leuven (Belgium, Europe).

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RL8. Precision psychiatry in bipolar disorder: integrating neuroimaging, machine learning, and clinical research

Key words: Bipolar disorder; Neuroimaging; Machine learning; Biomarkers; Clinical research; Precision psychiatry.

Abstract: This research line aims to develop multimodal biomarkers to predict illness course, treatment response, and functional outcomes in bipolar disorder. By integrating brain network alterations with cognitive and clinical features, the project aims to advance tools for early detection, patient stratification, and personalized treatment. The approach combines multimodal neuroimaging (including structural and functional MRI) with advanced computational analyses and machine learning applied to large, clinically rich datasets. The fellow will be embedded in two complementary research groups at IDIBAPS: the IMARD group, internationally recognized for its expertise in neuroimaging and computational methods in mental health, and the Bipolar and Depressive Disorders group, a global leader in bipolar disorder research with unique longitudinal cohorts. This synergistic environment is expected to enable the translation of neurobiological findings into clinically meaningful applications. The training environment fosters independence, creativity, and international collaboration, equipping the fellow with interdisciplinary skills at the interface of neuroscience, psychiatry, and data science. Overall, the project aims to contribute to advancing precision psychiatry and improving outcomes for individuals with bipolar disorder.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Joaquim Raduà (radua@recerca.clinic.cat) Imaging of mood- and anxiety-related disorders (IMARD) (Dr. Raduà Group)	Dr. Eduard Vieta (evieta@clinic.cat) Bipolar and depressive disorders (Dr. Vieta Group)

About the co-supervision: IMARD is a translational research group with expertise in neuroimaging, biomarkers, and computational methods in mental health. The Bipolar and Depressive Disorders group is a world-leading clinical team with unique patient cohorts, clinical trials, and extensive translational research. Together, they provide a multidisciplinary and internationally connected environment integrating neuroscience, psychiatry, and data science. Co-supervision will be jointly implemented with regular meetings and coordinated mentoring. IMARD will lead neuroimaging, biomarker development, and computational analyses, while the Bipolar and Depressive Disorders group will ensure access to well-characterized patient cohorts and guide clinical interpretation and translational relevance. This framework supports the fellow's development toward independence in precision psychiatry.

Examples of secondments opportunities: University of Copenhagen (Denmark, Europe).

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RL9. Reprogramming Immunity: CAR-T Cell Therapy to Halt Pulmonary Fibrosis

Key words: immunotherapy; CAR-T cells; pulmonary fibrosis; personalized medicine.

Abstract: Pulmonary fibrosis is a devastating, progressive disease in which excessive scarring of the lung severely limits breathing and has few effective treatment options. Our research line pioneers an innovative approach: harnessing the immune system to halt or reverse fibrosis by adapting CAR-T cell therapy—a breakthrough technology from oncology—to target the pathogenic cells that drive fibrotic progression. This strategy represents a transformative shift in how chronic lung diseases are addressed, moving beyond symptom management toward precision cellular intervention. We work directly with human patient samples, combining state-of-the-art immunoengineering with high-dimensional immune profiling, single-cell transcriptomics, and cutting-edge cell culture platforms using precision-cut lung slices (PCLS) as ex vivo models to preserve native tissue architecture and microenvironment. This patient-focused methodology ensures that therapeutic designs are directly informed by the biology of the disease in those affected, increasing translational relevance and accelerating the path from concept to clinic. Our goal is to open a new chapter in immunotherapy—one in which reprogrammed immune cells become tools not only to fight cancer, but also to restore lung function and improve quality of life in patients with fibrosis.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Azucena González (eagonzal@clinic.cat) Immunogenetics of the autoinflammatory response (Dr. Juan Group)	Dr. Tamara Cruz (cruz@recerca.clinic.cat) Inflammation and repair in respiratory diseases (Dr. Agustí Group)

About the co-supervision: The immunology group (Immunogenetics of the autoinflammatory response) pioneers CAR-T cell therapy in Spain, while the pulmonary group (Inflammation and repair in respiratory diseases) leads cutting-edge research on immunological alterations in pulmonary fibrosis. Co-supervision will be jointly implemented through structured coordination between both groups. Dr. Gonzalez will lead CAR-T design, immune engineering, and functional profiling, while Dr. Cruz will oversee pulmonary fibrosis studies using patient-derived samples and PCLS models. Regular joint meetings and coordinated planning will ensure continuous interaction. Established methodologies and hands-on support will enable rapid skill acquisition and ensure a robust translational workflow.

Examples of secondments opportunities: Ludwig Cancer Research (Lausanne, Switzerland, Europe); Jonsson Comprehensive Cancer Center (JCCC) (Los Angeles, US).

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RL10. Extracellular vesicle–mediated pulmonary coding of right ventricular maladaptation in pulmonary hypertension

Key words: Pulmonary hypertension; right ventricle; extracellular vesicle; imaging; heart-on-a-chip; ventricular assist device.

Abstract: Our project aims to characterize extracellular vesicles (EVs) as mediators of lung–right ventricle (RV) communication across pulmonary hypertension (PH) phenotypes. Specifically, it will: (1) define EV molecular profiles and cellular origin in experimental models of precapillary and postcapillary PH, including controls; (2) identify pre and post pulmonary EV gradients using paired pulmonary artery and left ventricular samples; (3) validate EV signatures in patients with PAH, isolated and combined postcapillary PH, and non-PH controls; (4) assess the causal effects of phenotype-specific EVs on cardiomyocyte function and remodeling using heart-on-a-chip systems; and (5) explore the feasibility of selective RV perfusion as a platform for future targeted delivery. Methodologically, the project combines well-characterized large-animal models, deeply phenotyped patient cohorts, and functional microphysiological platforms. EVs will be isolated from frozen plasma using standardized protocols, characterized by particle analysis, marker profiling, and proteomic/miRNA cargo analysis, and integrated with advanced imaging, invasive hemodynamics, histology, and clinical data. Functional validation will use pooled EVs by phenotype in heart-on-a-chip systems to assess contractility, metabolism, oxidative stress, and gene expression. An exploratory pilot will test selective cardiac perfusion using fluorescent vectors.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Ana García Álvarez (anagarci@clinic.cat) Cardiomyopathies, heart failure and secondary pulmonary hypertension (Dr. García Álvarez Group)	Dr. Ana Paula Dantas (adantas@recerca.clinic.cat) Atherosclerosis, coronary disease and heart failure (Dr. Sabaté Group)

About the co-supervision: The co-supervision team operates at the interface between clinical practice and laboratory research. Being co-led by a cardiologist specialized in pulmonary hypertension and a translational scientist with expertise in cardiovascular pathophysiology, it ensures a truly translational approach. This structure offers the researcher direct and continuous exposure to both patient care and basic research, within a highly collaborative and interdisciplinary environment. The clinical supervisor will guide disease characterization and access to patient data, while the basic scientist will oversee experimental design and data integration. The active involvement of both ensures a seamless translational workflow from bedside to bench and back.

Examples of secondments opportunities: Amsterdam University Medical Center (Netherlands, Europe); Mount Sinai Hospital (New York, US)

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RL11. Maternal Fetal Neurobiology of Cardiometabolic Health

Key words: Maternal Programming; Pregnancy; Central nervous system; Cardiometabolism; Maternal Fetal Medicine; Maternal Nutrition.

Abstract: This research line investigates how maternal metabolic changes and eating behaviors during pregnancy reprogram neurometabolic circuits in the mother and fetus, shaping long-term risk for cardiometabolic and neuropsychiatric disorders in both humans and mice. Leveraging a tightly integrated preclinical–clinical framework, the program will investigate how alterations in maternal feeding and emotional states influence the development, organization, and function of central and peripheral metabolic pathways across species. Advanced systems-level approaches, including whole-brain 3D imaging, single-nucleus RNA sequencing, fiber photometry, and chemogenetic circuit interrogation, will be combined with deep metabolic, cardiovascular, and neurodevelopmental phenotyping. A key strength of this research line is the direct integration of mechanistic discoveries from animal models with high-resolution human pregnancy data. The researcher will receive comprehensive training in experimental neurobiology, metabolic phenotyping, and translational cardiometabolism within the complementary environments of Dr Crispi and Dr Haddad research groups. This synergy creates a unique platform to uncover clinically actionable mechanisms linking maternal feeding behaviors to offspring vulnerability, ultimately supporting the development of preventive strategies and interventions aimed at improving cardiometabolic and mental health across generations.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Fàtima Crispi (fcrispi@clinic.cat) Fetal and perinatal medicine (Dr. Gratacós Group)	Dr. Roberta Haddad Tovolli (haddad@recerca.clinic.cat) Neuronal control of metabolism (NeuCoMe) (Dr. Claret Group)

About the co-supervision: Dr. Crispi will provide access to clinical, imaging, and biomarker datasets, allowing validation of circuit-level hypotheses in relevant human populations. Her team is recognized for maternal fetal cardiometabolism, placental function, and longitudinal pregnancy cohorts. Dr. Haddad will provide hands-on experience in a variety of cutting-edge techniques, such as 3D brain imaging, snRNAseq, and neuronal manipulation. Her team uses mouse models to understand feeding, and maternal behaviors during female life. Together, this co-supervision team provides a dynamic environment bridging basic and clinical science. Dr. Crispi will guide clinical interpretation, biomarker relevance, and access to human data, while Dr. Haddad will lead experimental design and neurobiological analyses. Both groups will be actively involved in mentoring, providing complementary expertise, and supporting the researcher's development into a competitive scientist with both fundamental and clinically oriented skills.

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Examples of secondments opportunities: King's College London (London, UK, Europe); Max Planck Institute (Germany, Europe); Université de Lyon/ IGFL – Institut de Génomique Fonctionnelle de Lyon/ Hôpital Universitaire Necker (Paris)/ Inserm (Lille) (France, Europe).

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RL12. Early-onset serrated polyposis syndrome: clinical and molecular characterization

Key words: serrated polyposis syndrome; colorectal cancer; next generation sequencing; early-onset disease; clinical study.

Abstract: Serrated polyposis syndrome (SPS) is a condition characterized by the presence of multiple and/or large serrated polyps in the colorectum and an increased risk of CRC (Carballal S. et al., 2022). Familial aggregation has been reported in a subset of cases, supporting a possible hereditary component. Our group has conducted pioneering work in the field, studying the germline and tumor DNA of 39 SPS patients from 16 families, with subsequent replication in an extended cohort of 211 patients. We have functionally tested five candidate genes for their involvement in SPS predisposition (Soares de Lima et al., 2023; Dominguez-Rovira et al., 2025). Building on this expertise, we focus now on a subgroup of patients diagnosed with SPS ≤50. Besides being an interesting cohort to study from the clinical point of view, focusing on early-onset SPS could help unravel additional genes for SPS germline predisposition. Early presentation of disease is a surrogate for a hereditary basis. Our previous experience in CRC and SPS will be key in analyzing them at the clinical and genetic level.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Sergi Castellví-Bel (sbel@recerca.clinic.cat) Genetic predisposition to gastrointestinal cancer (Dr. Castellví-Bel Group)	Dr. Sabela Carballal Ramil (carballal@clinic.cat) Gastrointestinal and pancreatic oncology (Dr. Castells Group)

About the co-supervision: This project benefits from a truly complementary and synergistic co-supervision structure, ensuring optimal guidance and outstanding research outcomes. Both supervisors are internationally recognized leaders in the field of serrated polyposis and hereditary colorectal cancer, each bringing distinct yet perfectly aligned expertise. Dr. Sabela Carballal's expertise ensures robust patient recruitment, comprehensive phenotyping, and clinically relevant interpretation of findings. Dr. Sergi Castellví-Bel's expertise guarantees the highest standards in molecular and genomic analyses, data interpretation, and translational impact. Co-supervision will be implemented through regular joint meetings, integrated oversight of laboratory and clinical work, and shared mentorship, providing the fellow with a unique opportunity to be trained at the interface of clinical gastroenterology and advanced genomic research. This powerful combination of expertise will not only foster scientific excellence but also provide the fellow with a highly competitive professional profile for future career opportunities.

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Examples of secondments opportunities: Institut für Humangenetik (UKB) (Bonn, Germany, Europe); Amsterdam University Medical Center – Radboudumc (Nijmegen)/ Princess Maxima Center for Pediatric Oncology (Utrecht)/ GenomeScan, (Leiden) (Netherlands, Europe); Instituto Português de Oncologia de Lisboa Francisco Gentil (IPOLFG) (Lisbon, Portugal, Europe).

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RL13. Enhancing Persistence and Antitumor Function of CD19 CAR-T Cells for Acute Lymphoblastic Leukemia Through Targeted Gene Overexpression

Key words: CAR-T cells; Acute Lymphoblastic Leukemia; CRISPR activation screening.

Abstract: Chimeric antigen receptor (CAR) T cell therapies targeting CD19 have shown high efficacy in B-cell acute lymphoblastic leukemia (ALL), yet a significant proportion of patients eventually relapse. We have developed ARI0001, a fully academic anti-CD19 CAR-T cell therapy with efficacy and safety profiles comparable to commercial products; however, relapses remain a major challenge, underscoring the need to enhance CAR-T cell fitness. The objective of this project is to engineer CD19 CAR-T cells for ALL with improved persistence and sustained antitumor activity through targeted overexpression of genes that promote T cell stemness and resistance to exhaustion. We will generate a curated list of 100–300 candidate genes through integrative analysis of publicly available clinical datasets, internal data, and preclinical CAR-T models. These candidates will be screened using a CRISPR activation (CRISPRa) overexpression library in CAR-T cells subjected to repeated antigen stimulation assays. Enriched candidates will be prioritized, and top hits will be validated in vitro and in vivo in ALL models, assessing effector function, persistence, and antitumor efficacy. The most promising candidate will undergo mechanistic characterization using transcriptomic and targeted approaches. We expect to identify novel regulators of CAR-T cell fitness and generate an optimized CD19 CAR-T cell therapy for ALL with improved durability and strong potential for clinical translation.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Sonia Guedan (sguedan@recerca.clinic.cat)	Dr. Julio Delgado (jdelgado@clinic.cat)
Cellular immunotherapies for cancer (Dr. Guedan Group)	Lymphoid neoplasms (Dr. López-Guillermo Group)

About the co-supervision: The project brings together a basic research group specialized in gene and cell engineering and a clinical hematology group with extensive experience in CAR-T trials. Both teams provide a dynamic, translational setting that bridges fundamental discovery with clinical application in CAR-T cell therapies. In particular, Dr. Delgado will define clinical needs, provide patient access, and guide translational and regulatory aspects, while Dr. Guedan will lead experimental design, CRISPR-based screening, and functional validation. Both supervisors will contribute to data interpretation and strategic decisions. Supported by experienced team members and institutional infrastructures, this framework enables high-quality research, strong translational impact, and comprehensive training of the PhD candidate.

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Examples of secondments opportunities: Peter MacCallum Cancer Centre (Melbourne, Australia); Karolinska Institutet (Stockholm, Sweden, Europe); Fraunhofer Institute for Cell Therapy and Immunology (Würzburg, Germany, Europe).

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RL14. Spatially resolved profiling of macrophage polarization to uncover their role in immune regulation and tissue remodeling during pancreas transplant rejection

Key words: Pancreas transplantation; allograft rejection; macrophage polarization; single cell transcriptomics; spatial transcriptomics; multiomics integration; multiplex immunofluorescence; immune regulation.

Abstract: Pancreas transplantation is a life-saving therapy for patients with end-stage kidney disease and insulin-dependent diabetes, yet acute rejection remains the principal barrier to long-term graft survival. The mechanisms underlying pancreas graft rejection are still poorly understood, limiting the development of targeted therapies. In our preliminary studies, we identified increased CD68+ macrophage infiltration, enrichment of M2-associated transcripts, and differential expression of pancreas-specific markers in rejected grafts, supporting the existence of a distinct and complex immune landscape. We hypothesize that T cell–macrophage crosstalk critically shapes macrophage polarization, promotes fibrosis, and drives graft dysfunction during acute rejection. To test this, we will construct a high-resolution pancreas graft immune atlas using single-cell RNA sequencing, validate key cellular states by immunohistochemistry and multiplex immunofluorescence, and map intercellular communication through spatial profiling. This integrative approach will uncover actionable mechanisms of rejection and enable the discovery of biomarkers and therapeutic targets to transform pancreas transplant care.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Elisenda Bañón Maneus (ebanon@recerca.clinic.cat) Nephrology and transplantation (LENIT) (Dr. Diekmann Group)	Dr. Ivan Archilla (archilla@clinic.cat) Molecular pathology of inflammatory conditions and solid tumours (Dr. Cuatrecases Group)

About the co-supervision: The participating groups form a multidisciplinary team of clinicians and basic scientists with strong expertise in pancreatic transplantation and transplant immunology. This project will entail the use of advanced molecular pathology approaches, including transcriptomics, digital pathology and confocal microscopy, supported by state-of-the-art infrastructure and fully equipped laboratories at IDIBAPS and the CELLEX Biomedical Research Centre. In particular, Dr. Bañón will oversee experimental design, molecular analyses, and mechanistic studies, ensuring scientific rigor and translational training. Dr. Archilla will instead provide clinical pathology expertise, guiding histological interpretation and clinical relevance. Regular joint meetings and shared mentoring will ensure close coordination. This framework supports the integration of basic and clinical research and fosters the development of an independent researcher.

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Examples of secondments opportunities: Wake Forest University (North Carolina, US); KU Leuven (Belgium, Europe); University Medical Center Rotterdam (Netherlands, Europe); Luxembourg Centre for Systems Biomedicine (LCSB) - University of Luxembourg (Luxembourg, Europe).

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RL15. Translational research in testicular cancer: liquid biopsy tumor biomarkers for precision clinical management and development of safe fertility preservation strategies

Key words: Testicular cancer; molecular biomarkers; liquid biopsy; tumor diagnosis and prognosis; sperm; fertility preservation.

Abstract: Testicular cancer (TC) is the most frequent malignancy in young adult males of reproductive age. Despite its rising incidence, many biological mechanisms and diagnostic challenges remain unresolved. These include the limited availability of robust methods for early cancer detection and identification of high-risk patients, as well as the safety of fertility preservation strategies. This research line addresses these gaps by integrating high-throughput molecular biology approaches. Our research focusses on elucidating the molecular pathogenesis of TC to identify biomarkers in liquid biopsies (blood and seminal fluid), such as microRNAs, circulating tumor DNA and proteins. Such non-invasive biomarkers are intended to facilitate early detection, predict tumor progression and aggressiveness, and enable precise disease monitoring, ultimately enhancing patient care. We also explore the epigenetic impact of testicular tumors on adjacent germ cells. Tumor-induced alterations may compromise sperm content and quality, and eventually offspring health. Our goal is to characterize these changes and develop safe, evidence-based fertility preservation strategies for these patients. By bridging molecular insights into clinical needs, this research aims to contribute to precision medicine and to improve both survival and quality of life for patients with TC.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Judit Castillo Corullón (juditcastillo@ub.edu) Molecular biology of reproduction and development (Dr. Oliva Group)	Dr. Antonio Alcaraz Asensio (aalcaraz@clinic.cat) Genetics and urological tumours (Dr. Alcaraz Group)

About the co-supervision: The Molecular Biology of Reproduction and Development group is an international reference in the study of male reproductive biology and paternal contribution beyond fertilization, while the Genetics and Urological Tumours Group has long-standing expertise in molecular characterization and clinical management of urological cancers, with strong scientific output and patents. Dr. Castillo is a basic and translational researcher that will contribute to daily supervision of the candidate and will provide her experimental expertise in advanced high-throughput molecular biology strategies and the search for biomarkers of health and disease. Dr. Alcaraz has a long-standing experience in uro-andrology and translational cancer research; by working alongside him, the fellow will oversee patient recruitment and the collection of biological samples, ensuring proper integration of the clinical component into the study. In parallel, the molecular biologists of both groups will provide additional support in methodological aspects, including molecular analyses, data interpretation, and integration of results. This strong collaboration between basic and clinical

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supervisors will guarantee a comprehensive translational approach, facilitating the generation of robust findings with clear clinical relevance.

Examples of secondments opportunities: Radboud University Nijmegen Medical Centre (Netherlands, Europe); Institute Curie/ Institute Cochin Inserm (Paris, France, Europe); Vrije Universiteit Brussel (Belgium, Europe).

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RL16. Exploring opportunities of targeting DYRK1A to improve pancreatic cancer treatment

Key words: Pancreatic cancer, organoids, tumor microenvironment, therapeutic approaches, therapy resistance, DYRK kinases.

Abstract: Pancreatic ductal adenocarcinoma (PDAC) is a highly lethal cancer, with a 5-year survival rate of approximately 11%. PDAC is driven by the acquisition of genetic alterations, with KRAS point mutations present in nearly 90% of tumors. PDAC is also characterized by a dense desmoplastic stroma enriched in cancer associated fibroblasts (CAFs) and a profoundly immunosuppressive microenvironment. These features contribute to PDAC aggressiveness and poor therapeutic response, while also offering opportunities for the development of new therapeutic strategies. Our group has contributed to the PDAC field by demonstrating that the protein kinase DYRK1A is upregulated in tumor cells and acts as a protumorigenic factor by stabilizing the receptor tyrosine kinase c-MET. More recent data also indicates a prominent role for DYRK1A in influencing the tumor microenvironment. This research line is now expanding to explore DYRK1A as a potential therapeutic target in PDAC, supported by the availability of potent and selective DYRK1A inhibitors. The DYNAMIS researcher will investigate the effects of DYRK1A inhibition in PDAC by integrating omics approaches with functional studies in experimental models of PDAC and 3D patient-derived tumor organoids. Integrating the study of DYRK1A multifaceted activities and a comprehensive molecular profiling of patient tumors, will inform the design of combination strategies aimed at sensitizing tumors and enhance treatment efficacy.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Cristina Fillat (cfillat@recerca.clinic.cat) Gene therapy and cancer (Dr. Fillat Group)	Dr. Ismael Macias (imacias@clinic.cat) Translational oncology in upper gastrointestinal cancers (Dr. Macarulla Group)

About the co-supervision: The participating research groups have a strong interest in significantly impacting the future of pancreatic cancer. Dr. Fillat's group is a fundamental-translational laboratory with a collaborative environment, while Dr. Macias develops his research in a clinical environment, facing patient reality and formulating hypotheses based on direct clinical observations. The continuous dialogue of both groups fosters a synergistic environment. The researcher will be allocated in Dr. Fillat's laboratory, and day-to-day experiments will be discussed with Dr. Fillat and group members. The molecular profiling of patient tumors and data management will instead be supervised by Dr. Macias. Weekly meetings with Dr. Macias will be established for the follow-up of the project.

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Examples of secondments opportunities: Marburg University School of Medicine (Germany, Europe); University College Dublin (Ireland, Europe); Toulouse Cancer Research Center (France, Europe).

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RL17. Secreted Lipid Droplets Uncovered: From Cell Biology to Disease

Key words: secreted lipid droplets; leukemia; sepsis; obesity; diagnostic biomarkers; intercellular communication.

Abstract: Lipid droplets (LDs) are pivotal organelles in eukaryotic cells, functioning as the primary reservoirs of lipids and key regulators of cellular energy homeostasis. While they have traditionally been considered as intracellular components, our recent findings challenge this paradigm by demonstrating that LDs can be actively secreted into the extracellular space and subsequently internalized by recipient leukemic cells. This previously unrecognized phenomenon suggests the existence of novel means of intercellular metabolic communication. However, the molecular mechanisms, regulatory cues, and physiological relevance of LD secretion remain unexplored. SHIELD (Secretion and Handling of Intercellular Extracellular Lipid Droplets) aims to establish a new conceptual framework for LD biology by addressing this knowledge gap. The project is structured around characterizing the composition of secreted LDs, identifying the signaling triggers and molecular mechanisms governing LD secretion, and determining the functional and clinical relevance of secreted LDs in leukemia, sepsis and obesity. SHIELD bridges cell biology with translational applications, positioning LDs as mechanistic drivers and potential diagnostic biomarkers. Beyond its scientific impact, our project presents a strong interdisciplinary training environment for students, equipping them with skills necessary to address complex biological questions and translating their findings into real-world applications in healthcare.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Albert Pol (apols@ub.edu) Lipid trafficking and disease (Dr. Pol Group)	Dr. Jordi Esteve (jesteve@clinic.cat) Myeloid neoplasms (Dr. Esteve Group)

About the co-supervision: The project integrates two interdisciplinary research groups with complementary expertise, bridging fundamental and clinical research across the Parc Científic de Barcelona and Hospital Clínic. Albert Pol, with a long-standing commitment to teaching and mentorship as an Assistant Professor at the University of Barcelona and supervisor of multiple PhD theses, will lead the conceptual and mechanistic aspects of the project, including hypothesis development, experimental design, and data generation. Jordi Esteve, a medical doctor, will ensure access to patient samples and oversee the translational aspects in leukemia, guiding the validation and potential clinical implementation of the findings. Together, the two groups will collaborate closely to maintain a continuous feedback loop between discovery and application, maximizing the scientific and societal impact of the project. Regular meetings will facilitate the exchange of ideas and the resolution of experimental and logistical challenges. The PhD candidate will also benefit from a strong international exposure through

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Albert Pol's collaborations within an EU Training Network including the universities of Groningen, Hamburg-Eppendorf, Utrecht, Helsinki, Munich, Bristol, and Amsterdam together with industry groups such as AstraZeneca, NEBION, and InteRNA Technologies.

Examples of secondments opportunities: SHIELD is part of an international consortium funded by the European Research Council that studies the role of LDs in immunity (DRIMMS) together with the Institute Pasteur (Paris, France, Europe) and the University of Queensland (Australia). Therefore, the candidate will enjoy an internationally recognized scientific environment and the possibility of completing secondments at these centers.

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RL18. Why do some fatty livers become cancer? Decoding RNA and circadian control to predict and prevent liver cancer

Key words: MASLD, Hepatocellular carcinoma, Translational control, Circadian biology, Disease progression, Precision medicine.

Abstract: What if we could predict who will develop liver cancer, years before it happens? Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) is a leading cause of hepatocellular carcinoma, yet only a subset of patients progresses to cancer. Understanding why remains a major biomedical challenge, particularly in the context of obesity and aging. This PhD project addresses this question by exploring a still underexplored layer of biology: translational control. We hypothesize that disease progression is driven not only by genetic or transcriptional alterations, but by how RNA is selectively translated into proteins under chronic metabolic stress. We will investigate how obesity and aging disrupt the liver's adaptive stress response and its circadian regulation, impairing protective mechanisms and promoting cancer development. The project integrates molecular biology, advanced multi-omics, and clinical research in a translational framework. The candidate will identify RNA regulatory networks, validate key pathways in experimental models, and link molecular signatures with clinical outcomes using well-characterized patient cohorts. Embedded at Hospital Clínic–IDIBAPS, this project offers a unique integration of mechanistic and clinical expertise, with access to international training and secondments. This is an opportunity to uncover how metabolism, aging, and biological timing drive cancer and to translate this knowledge into early detection and innovative therapies.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Mercedes Fernández-Lobato (mlobato@recerca.clinic.cat)	Dr. Isabel Graupera (igraupe@clinic.cat)
Translational control of liver disease and cancer (Dr. Fernández-Lobato Group)	Chronic liver diseases: molecular mechanisms and clinical consequences (Dr. Ginès Group)

About the co-supervision: The Translational Control group will provide expertise in RNA regulation and liver cancer biology, while the Chronic Liver Diseases group will contribute with extensive clinical knowledge, large patient cohorts, and participation in international studies. In particular, Dr. Fernández will oversee the mechanistic and experimental work, including advanced molecular approaches, while Dr. Graupera will provide the clinical leadership, ensuring access to patient cohorts, supporting clinical data interpretation, and guiding aspects related to disease progression and translational applicability. Co-supervision will be implemented through regular joint meetings, coordinated planning of objectives, and continuous evaluation of progress. Both groups will actively contribute to training, resources,

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and mentorship, ensuring comprehensive scientific development and strong career support for the fellow.

Examples of secondments opportunities: University of Düsseldorf/ University of Münster/ University of Heidelberg (Germany, Europe); Institute Curie (Paris, France, Europe).

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RL19. Stem cell-based therapy for brain repair in stroke

Key words: Ischemic Stroke; Neuroinflammation; Cell Transplantation; Neuron; Oligodendrocyte; Monocyte.

Abstract: Stroke is a leading cause of disability, and while stem cell therapies show exciting potential to rebuild damaged brain circuits, they often fail to translate to real patients. Why? One major difference is obesity — a condition affecting most stroke patients but rarely modeled in the lab. Our project tackles this gap by asking a bold question: does obesity create a hostile environment that prevents the brain from repairing itself? We focus on how chronic inflammation and metabolic dysfunction reshape the brain's ability to recover after stroke. My laboratory will explore how obesity impacts cutting-edge regenerative therapies. We transplant human stem cell–derived neurons and oligodendrocytes into the injured brain and track how well they survive, connect, and rebuild neural networks. Using advanced imaging, electrophysiology, and spatial transcriptomics, we uncover why regeneration succeeds or fails. Even more exciting, we test whether improving metabolic health can boost recovery, opening new avenues for personalized therapies. This project combines neuroscience, stem cells, immunology, and metabolism in a highly interdisciplinary environment. If you're interested in brain repair, translational research, and big unanswered questions, our laboratory offers a unique opportunity to make real impact.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Daniel Tornero Prieto (daniel.tornero@ub.edu) Pathophysiology and treatment of neurodegenerative disorders (Dr. Alberch Group)	Dr. Xabier Urra Nuin (xurra@clinic.cat) Cerebrovascular diseases (Dr. Chamorro Group)

About the co-supervision: The Laboratory of Neural Stem Cells and Brain Damage (University of Barcelona) will act as the main host institution, providing the primary research environment and day-to-day supervision. The fellow will be physically based in this laboratory and trained in stem cell biology, *in vivo* stroke models, and advanced techniques for assessing neuronal repair and network integration. The Cerebrovascular diseases group (Hospital Clínic–IDIBAPS) will contribute strong clinical and translational expertise in stroke. This group will provide access to well-characterized patient samples and relevant clinical data, ensuring alignment of the experimental work with clinical reality. Researchers from both groups will closely interact with the fellow, participating in experimental design, data interpretation, and regular joint meetings. This integrated approach will ensure interdisciplinary training and active involvement of all partners throughout the project.

Examples of secondments opportunities: Lund Stem Cell Center (Sweden, Europe).

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RL20. Organoid-based modeling of hepatic vascular diseases

Key words: Endothelial dysfunction; Disease modeling; Multicellular organoid models; Patient-derived organoids; iPSC-derived vascular organoids.

Abstract: Vascular liver diseases (VLD) are rare, under-recognized disorders affecting predominantly young individuals, leading to portal hypertension, chronic morbidity, and absence of disease-modifying therapies. Their pathogenesis remains poorly understood, largely due to the lack of experimental models that faithfully recapitulate human disease. These conditions arise in the splanchnic vasculature, are not reproduced in animal systems, and access to patient material is limited. We propose a disruptive, human-centric strategy to overcome these limitations by developing the first integrative platform of vascular liver disease modelling. We will pursue parallel, state-of-the-art approaches, including the generation of vascularized organoids from liver biopsies and human pluripotent stem cell (hPSC)-derived vascular systems with the aim of reconstructing the splanchnic vascular niche in vitro and capturing key disease mechanisms, including endothelial dysfunction, immune-vascular crosstalk, and thromboinflammation. These models will be informed and validated using patient-derived multi-omic data, enabling mechanistic discovery and therapeutic exploration. This project brings together complementary expertise: a leading clinician-scientist in VLD with unique access to patient samples, and a specialist in organoid and stem cell technologies. This approach aims to establish a new framework for modelling human vascular diseases and enable mechanistic discovery and therapeutic development.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Virginia Hernández-Gea (vihernandez@clinic.cat) Liver disease and the vascular system (LiVas) (Dr. Hernández-Gea Group)	Dr. Pau Sancho-Bru (psancho@recerca.clinic.cat) Liver cell plasticity and tissue repair (Dr. Sancho-Bru Group)

About the co-supervision: The participating research groups offer a highly interactive clinical and research environment. The LiVas group integrates a clinical and laboratory setting focused on vascular liver diseases, while the plasticity and tissue repair group provides a strong experimental environment specialized in liver biology, regeneration and organoid technologies. The group led by Dr. Virginia Hernández-Gea will provide the clinical and disease-oriented framework of the research line, while the group led by Dr. Pau Sancho Bru will contribute specialized expertise in stem cell technologies, hepatic regeneration, and the generation and characterization of organoid systems. Both supervisors will be actively involved throughout the project, ensuring integration of clinical insight with cutting-edge experimental approaches and providing the researcher with interdisciplinary training and guidance.

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Examples of secondments opportunities: Stem Cell Institute Leuven (Belgium, Europe); King's College (London, UK, Europe); Université Paris-Cité, Inserm (France, Europe), DZHK - German Centre for Cardiovascular Research (Munich, Germany, Europe).

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RL21. Unravelling the path towards human esophageal tumorigenesis: studying benign esophageal lesions to identify key aspects of malignant transformation

Key words: Human cancer; Esophagus; Benign tumours; Mutations; Tumour evolution; Metabolism.

Abstract: Esophageal carcinoma (ESCC) has a 5-year survival below 25% due to a late diagnosis. ESCC are well characterized but little is known about earlier tumour stages and precancerous lesions. Esophageal benign lesions share risk factors with ESCC but are much more common and poorly studied and why they mostly do not develop into cancer is unknown. Understanding their position in the tumorigenesis process, either as a early precursor of ESCC or a tumorigenesis dead-end generated by the same triggering factors, could help to develop new therapies intercepting the earliest stages of esophageal cancer. The student will use normal human esophagus samples collected by Dr Cuatrecasas group to identify the most common benign/precancerous esophageal lesions and characterize them with a multidisciplinary approach, exposing her/him to a large palette of advanced techniques. Cutting-edge DNA-seq in collaboration with the Sanger Institute (Cambridge) will be used to detect the mutations contributing to lesion formation. RNA-seq, immunostainings, advanced 3D confocal microscopy and metabolic analysis will also help to identify the genetic pathways and cell types altered and the malignancy traits present/absent in benign lesions. She/he will also combine those analysis with our lipid metabolism expertise to determine when the metabolic changes in lipid metabolism described to drive ESCC progression occur and their contribution to early tumorigenesis. Advanced primary 3D human cultures of those lesions will be developed and used for drug-discovery (Herms Nat.Gen.2024). Understanding the differences between malignant and benign lesions could lead to the identification of early therapeutic targets to drive malignant lesions into a benign fate.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Miriam Cuatrecasas (MCUATREC@clinic.cat) Molecular pathology of inflammatory conditions and solid tumours (Dr. Cuatrecasas Group)	Dr. Albert Herms (albertherms@ub.edu) Lipid trafficking and disease (Dr. Pol Group)

About the co-supervision: The student will be embedded in the Lipid trafficking and disease group at the Parc Científic de Barcelona (PCB), a scientifically exciting international environment with multiple institutes and many networking opportunities. There, Dr. Herms will provide expertise in epithelial biology, somatic mutations and esophageal cancer (Herms et al Nat Gen 2024, Colom et al Nature 2021). Dr. Cuatrecasas and her group at pathology department of Hospital Clinic will add the clinical perspective, together with her expertise in histopathological and molecular diagnostic and therapeutic target identification. The student

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will benefit from Dr. Herms's training and scientific guidance on a day-to-day basis and regular meetings with Dr. Cuatrecasas to discuss the progression of the project. In addition, the student will participate in group meetings at both groups and benefit from training courses and conferences at IDIBAPS and other institutions at Parc Científic de Barcelona (PCB), as well as networking opportunities in conferences and through international collaborators. The complementary backgrounds of both groups will provide a solid foundation for a PhD thesis.

Examples of secondments opportunities: Queensland University (Australia); Wellcome Sanger Institute / Cambridge Stem cell Institute / Gurdon Institute (Cambridge, UK, Europe); Institut Pasteur (Paris, France, Europe).

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RL22. Targeting CFTR-autophagy crosstalk to overcome KRAS-driven pancreatic cancer progression and therapy resistance

Key words: Pancreatic cancer; KRAS; CFTR; Autophagy; Therapy resistance; Translational oncology.

Abstract: Pancreatic ductal adenocarcinoma (PDAC) is one of the deadliest cancers due to early dissemination, strong therapy resistance and limited benefit from current KRAS-targeted strategies. Emerging evidence indicates that loss of CFTR chloride channel expression contributes to pancreatic tumor progression, epithelial plasticity and aggressive phenotypes. In parallel, KRAS-driven PDAC relies heavily on autophagy to support metabolism, stress tolerance and therapeutic adaptation. This project will investigate the functional interplay between CFTR, oncogenic KRAS signaling and autophagy in PDAC. We hypothesize that CFTR loss rewires autophagy to sustain tumor survival, plasticity and treatment resistance, and that restoring CFTR activity and/or targeting autophagy may reveal new therapeutic vulnerabilities. The fellow will combine cell biology, molecular profiling and preclinical models to: (i) define how CFTR-dependent regulation of autophagy and lysosomal function; (ii) assess KRAS control of CFTR–autophagy dependencies; (iii) identify molecular predictors of response; and (iv) test rational combination therapies using CFTR modulators, autophagy inhibitors and KRAS inhibitors. This interdisciplinary project integrates mechanistic and translational approaches using in vitro, mouse and human PDAC datasets, with potential extension to patient-derived organoids, to generate new strategies for a disease with urgent unmet clinical needs.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Eva Vaquero (EVAQUERO@clinic.cat)	Dr. Caroline Mauvezin (caroline.mauvezin@ub.edu)
Gastrointestinal and pancreatic oncology (Dr. Castells Group)	Cell biology, intracellular compartments and cancer (Dr. Montero Group)

About the co-supervision: The Gastrointestinal and pancreatic oncology group at IDIBAPS-Hospital Clínic combines clinical and translational expertise in pancreatic diseases, with a strong focus on PDAC biology, CFTR-related mechanisms and access to patient cohorts, biobanks and core facilities. The Cell biology, intracellular compartments and cancer group (University of Barcelona/IDIBAPS) is internationally recognized for its work in autophagy, lysosomal biology and advanced cell imaging. Both groups work within a highly interactive biomedical environment with genomics, microscopy, bioinformatics and animal facilities, enabling seamless interdisciplinary collaboration. The main supervisor, Dr. Eva Vaquero, will coordinate the project and lead the pancreatic cancer and translational parts of the work, including PDAC cell and mouse models, KRAS signaling studies, therapeutic testing and

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interpretation of the clinical relevance of the results. Dr Caroline Mauvezin will co-supervise the project and provide expertise in cancer biology and autophagy, with a particular focus on lysosome-dependent catabolic processes. She will also provide advanced knowledge in mechanistic assays and state-of-the-art imaging approaches. Both supervisors will work closely together throughout the project, with regular meetings to discuss progress, plan experiments and review results. The fellow will have the opportunity to work in both laboratories and gain complementary experience in cell biology, imaging and mouse models of pancreatic cancer. Support will also be provided for animal experimentation training, if appropriate.

Examples of secondments opportunities:

(1) European autophagy and cancer cell biology laboratories (2–3 months): A short-term placement in leading European laboratories specializing in autophagy and cancer cell biology, such as the Tumor Cell Death laboratory at Cancer Research UK (CRUK, United Kingdom), the Oncogene Biology laboratory at the Francis Crick Institute (United Kingdom), or Autophagy in Cancer laboratory at the University Hospital Essen (Germany).

(2) International pancreatic cancer centers (2–3 months): Secondments in internationally recognized centers working on KRAS-targeted therapies and advanced preclinical models, including the Laboratory of Medical & Molecular Oncology at Vrije Universiteit Brussel (Belgium, Europe) and the Centre de Recherche en Cancérologie de Marseille (CRCM, INSERM/Aix-Marseille University, France, Europe).

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RL23. Decoding novel neural circuits of energy homeostasis in obesity and type 2 diabetes

Key words: Hypothalamus; energy homeostasis; Type 2 diabetes; Obesity.

Abstract: This research line focuses on the identification and characterization of novel neuronal populations involved in the regulation of body weight, feeding behavior, and energy metabolism in the context if type-2 diabetes and obesity. Using cell type-specific Cre driver lines, we will define neuronal subpopulations with distinct molecular and functional identities within hypothalamic and extra-hypothalamic circuits. The project combines preclinical and translational approaches, including advanced techniques like 3D brain imaging, single-nucleus RNA sequencing, chemogenetics to selectively modulate neuronal activity in vivo and fiber photometry to monitor real-time neuronal dynamics amongst others. This strategy enables the establishment of causal links between neuronal activity and feeding behavior or energy expenditure. The researcher will undergo comprehensive training in experimental neurobiology, metabolic phenotyping, and translational endocrinology through close collaboration between the groups of Dr. Claret and Dr. Vidal. This integrated environment offers a strong framework to investigate fundamental biological mechanisms while maintaining clear clinical relevance. By addressing these questions, the project seeks to generate new insights into the neurobiology of energy homeostasis and to support the development of more effective strategies to reduce the burden of obesity and diabetes.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Marc Claret (mclaret@recerca.clinic.cat) Neuronal control of metabolism (NeuCoMe) (Dr. Claret Group)	Dr. Josep Vidal Cortada (jovidal@clinic.cat) Translational research in diabetes, lipids and obesity (Dr. Vidal Group)

About the co-supervision: Dr. Claret will provide hands-on training in cutting-edge neurobiology, fostering both technical and conceptual expertise in innovative approaches such as 3D brain imaging, single-nucleus RNA-seq, and targeted neuronal manipulation. Dr. Vidal leads a clinical unit in endocrinology, obesity, and diabetes, providing access to patient cohorts and biobanks. Both are embedded at IDIBAPS, ensuring access to state-of-the-art core facilities within a dynamic translational environment. Co-supervision will be structured through regular joint meetings, shared data analysis, and integrated project design, combining basic and clinical perspectives. Both groups will actively mentor career development, fostering a balanced profile across fundamental and clinical research. Regular lab meetings and journal clubs will strengthen critical thinking, data interpretation, and communication skills. Together with IDIBAPS training programs, this environment will equip the fellow with the skills needed for an independent and competitive research career.

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Examples of secondments opportunities: Yale University (Connecticut, US); Paris Brain Institute/ Université Paris Cité/ Inserm Lille (France, Europe); Max Planck Institute for Metabolism Research (Cologne, Germany, Europe).

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RL24. Identifying mechanisms and biomarkers of response and resistance to immunotherapies in liver cancer and melanoma

Key words: Immunotherapy; single cell spatial transcriptomics; tumor microenvironment; biomarkers of response to treatment; melanoma; hepatocellular carcinoma.

Abstract: Cancer is shaped by complex interactions within the tumor microenvironment (TME). Recent advances in single-cell and spatial transcriptomic technologies have revealed that immune infiltration landscape is associated with immunotherapy response. This project aims to dissect the TME cellular and molecular architecture and translate these insights into improved therapeutic strategies in melanoma and liver cancer. The project is structured in three main aims: (1) To generate a high-resolution atlas of the TME using state-of-the-art technologies (single-cell RNA sequencing, spatial transcriptomics). (2) To identify predictors of response/resistance to immunotherapies, using large, well-annotated clinical datasets, and advanced computational and artificial-intelligence-based strategies. (3) To develop treatment strategies to enhance response or overcome resistance to current treatments using patient-derived organoids and mouse models of cancer and generate the rationale for future clinical trials in patients. This work builds on recent advances from the group in translational cancer research, including: (a) Llovet et al., Cell 2026; (b) Cappuyns et al., J of Hepatol 2025; and (c) Tasdogan et al., Nat Rev Dis Primers 2025. Overall, the project will broaden knowledge of how the TME mediates response to immune therapies, facilitate the identification of novel treatment approaches to overcome resistance, and promote precision medicine through the discovery of predictive biomarkers.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Josep M. Llovet (jmllovet@clinic.cat)	Dr. Susana Puig (spuig@clinic.cat)
Translational research in hepatic oncology (Dr. Llovet Group)	Melanoma: imaging, genetics and immunology (Dr. Puig Group)

About the co-supervision: The Translational Research in Hepatic Oncology group studies the molecular pathogenesis and treatment of hepatocellular carcinoma, while The Melanoma: Imaging, Genetics and Immunology Group focuses on improving prevention, early diagnosis and personalised treatments. Both groups are internationally recognized teams integrating clinicians, bioinformaticians, and wet-lab scientists, provide access to cutting-edge omics/imaging resources and participate in large consortia and clinical trials. Prof. Llovet will act as primary supervisor, contributing his internationally recognized expertise in HCC, immunogenomics, and mechanisms of resistance to immune checkpoint inhibitors. His group provides access to large HCC cohorts, spatial transcriptomics pipelines, cytokine profiling, and microbiome analysis. These resources will support the cross-cancer comparative analyses

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and ensure translational integration of biomarkers into ongoing clinical trials. Prof. Susana Puig will serve as co-supervisor, leading the melanoma arm of the project. She will oversee recruitment and phenotyping of cutaneous and SNMM patients, leveraging ~60 retrospectively collected SNMM cases and access to CM cohorts. Her group will lead the molecular profiling of melanoma (bulk RNA-seq, immunogenomics) and provide access to imaging/AI expertise. Co-supervision will include regular meetings, shared milestones, and rotation across both lab environments. This complementary setting ensures strong multidisciplinary training and supports the development of an independent researcher in translational cancer research.

Examples of secondments opportunities: Icahn School of Medicine at Mount Sinai (New York, US); University of Tübingen (Germany, Europe); INSERM and University of Paris (France, Europe); University of Manchester (UK, Europe). Intersectoral placements with biotech/pharma partners (e.g., Athena Tech S.L., iToBoS).

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RL25. Engineering innate immunity to delete donor-specific antibody memory in kidney transplantation

Key words: Kidney transplantation; allograft rejection; desensitization; immunotherapy; chimeric antigen receptors.

Abstract: Kidney transplantation provides excellent short-term results, yet long-term graft survival remains limited by immune mechanisms insufficiently controlled by current therapies. Antibody-mediated rejection is a major unmet need, as conventional immunosuppression is poorly effective against donor-specific antibodies and associated with significant toxicity. These pathogenic antibodies arise from HLA mismatches between donor and recipient and strongly predict chronic rejection and graft failure. Their production is driven by adaptive immune cells, particularly B cells and plasma cells. This research line aims to develop a disruptive, precision immunotherapy to selectively eliminate pathogenic antibody-producing cells by targeting B cells and plasma cells specific for defined HLA antigens. Building on our established experience with chimeric anti-HLA antibody receptors (CHAR), we propose the use of genetically engineered NK cells, which preserve functionality under standard immunosuppressive regimens and offer a favourable safety and controllability profile. Beyond improving long-term graft survival, this approach has the potential to reduce pre-transplant sensitization and expand transplant opportunities for highly sensitized patients. Overall, this project represents a transformative proof of concept for personalized, cell-based immunotherapy designed to redefine immune control in kidney transplantation.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Francisco Lozano Soto (flozano@clinic.cat) Immune receptors of the innate and adaptive system (Dr. Lozano Soto Group)	Dr. Jordi Rovira Juarez (jrovira1@recerca.clinic.cat) Nephrology and transplantation (LENIT) (Dr. Diekmann Group)

About the co-supervision: The research groups form a multidisciplinary and international team with complementary expertise in transplant immunology and innate–adaptive immune interactions. The unique integration of cutting-edge basic research with direct clinical expertise provides a clear competitive advantage, enabling innovative hypotheses and rapid translational validation. The project will be conducted in state-of-the-art laboratories at the CELLEX and CEK facilities, offering advanced infrastructure for genetic modification and cell culture to accelerate the development of innovative immunotherapies. Dr. Rovira will lead the experimental and mechanistic aspects, including study design, molecular analyses, and data interpretation. Dr. Lozano will provide clinical and translational expertise, guiding the integration of findings into clinically relevant contexts. Co-supervision will involve regular joint meetings to coordinate progress and decisions. Both co-supervisors, together with their

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respective research groups, will actively contribute to the fellow's training by supporting the development of scientific communication skills, manuscript and grant writing, networking within the research community, and access to specialized training opportunities.

Examples of secondments opportunities: Leiden University Medical Center, Erasmus MC (Netherlands, Europe); University Hospital Regensburg (Germany, Europe).

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RL26. Toward Early Intervention in Pancreatic Cancer: Translational Strategies for Prevention and Detection

Key words: pancreatic cancer, early detection, cancer prevention, liquid biopsy, hereditary risk, translational research.

Abstract: Pancreatic ductal adenocarcinoma (PDAC) remains one of the deadliest cancers because most patients are diagnosed at advanced stages. Improving outcomes requires translational strategies that move beyond treating established disease toward risk stratification, detection of precursor lesions, and minimally invasive diagnosis of early-stage cancer. This project will integrate clinical, molecular, and translational approaches to identify biomarkers and high-risk profiles for pancreatic cancer prevention and early diagnosis. We will study blood-based biomarkers, including circulating tumour-derived nucleic acids and complementary analytes, together with clinical, imaging, and hereditary-risk data from individuals with pancreatic cancer, precursor lesions, and high-risk subjects under surveillance. The goal is to define biomarker signatures that distinguish benign pancreatic conditions from early malignant transformation and support personalised surveillance and prevention strategies. Functional and translational validation in independent cohorts and biospecimens will prioritise robust candidates with clinical applicability. By combining Tian Tian's expertise in liquid biopsy, molecular profiling, and upper GI translational oncology with Leticia Moreira's expertise in hereditary gastrointestinal cancer, risk assessment, and early detection, this project aims to generate clinically actionable tools for earlier diagnosis and better prevention of pancreatic cancer.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Tian Tian (ttian@recerca.clinic.cat) Translational Oncology in Upper Gastrointestinal Cancer (Dr. Macarulla and Dr. Tian Group)	Dr. Leticia Moreira (lmoreira@clinic.cat) Genetic predisposition to gastrointestinal cancer (Dr. Castellví-Bel Group)

About the co-supervision: The Translational Oncology in Upper Gastrointestinal Cancers group develops molecular profiling, biomarker discovery, and liquid biopsy approaches in pancreatic and upper GI tumours, while the Genetic Predisposition to Gastrointestinal Cancer group provides expertise in hereditary cancer, risk stratification, and early detection. Of note, Dr. Moreira coordinates the High-Risk Digestive Cancer Committee at Hospital Clínic. The fellow will work in a collaborative environment linked to Hospital Clínic, IDIBAPS core facilities, and clinical teams. Dr. Tian Tian will lead the molecular and translational components of the project, including biomarker-discovery strategy, integration of liquid biopsy and tumour molecular data, and links with upper GI clinical trials and biospecimen resources. Dr. Leticia Moreira will lead the prevention and early-detection components, including identification of

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high-risk individuals, hereditary-risk assessment, clinical interpretation, and translational implementation. She will also contribute to biomarker identification, particularly epigenetic markers, and provide access to an established surveillance cohort of around 200 individuals at risk of pancreatic cancer with associated clinical data and biological samples. Co-supervision will be structured through regular joint meetings, shared milestones, co-review of data and manuscripts, and coordinated training across laboratory, bioinformatics, and clinical settings.

Examples of secondments opportunities: strong collaborations with leading international upper GI cancer centers, including:

- The University of Texas MD Anderson Cancer Center/ Memorial Sloan Kettering Cancer Center/ Herbert Irving Comprehensive Cancer Center/ Dana-Farber Cancer Institute in Boston (US);
- Oxford University Hospitals NHS Foundation Trust (UK, Europe);
- Instituto Português de Oncologia do Porto (Portugal, Europe).

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RL27. Neutrophils and NETs in Hepatocellular carcinoma: mechanisms and impact on immunotherapy

Key words: Hepatocellular carcinoma; Tumor immunology; Neutrophils and NETs; Immunotherapy; Interdisciplinary training; International collaboration.

Abstract: Hepatocellular carcinoma (HCC) is one of the leading causes of cancer-related death worldwide, with limited therapeutic options and suboptimal responses to immunotherapy. Increasing evidence highlights the crucial role of innate immune cells in shaping the tumor microenvironment and influencing therapy outcomes. Among these, neutrophils and their ability to release neutrophil extracellular traps (NETs) have emerged as key regulators of tumor growth, inflammation, and immune evasion. However, the precise mechanisms through which neutrophils and NETs contribute to HCC progression and modulate immunotherapy efficacy remain poorly understood. This research line focuses on dissecting the mechanistic roles of neutrophils and NETs in HCC, using robust experimental models that combine diethylnitrosamine injection with a Western diet to closely mimic human disease. By integrating immunophenotyping, molecular analyses, and functional assays, we aim to identify how neutrophil-driven pathways shape tumor–immune interactions and determine responsiveness to immune checkpoint inhibitors. Ultimately, this project seeks to generate actionable insights into the neutrophil/NET axis, paving the way for novel strategies to optimize immunotherapy in liver cancer. The PhD student joining this project will gain expertise in tumor immunology, in vivo HCC models, and translational cancer research, taking advantage of participating in contributing to a growing field with direct clinical relevance.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Montserrat Marí (monmari@clinic.cat)	Dr. Marco Sanduzzi-Zamparelli (msanduzzi@clinic.cat)
Hepatocellular signaling and cancer (Dr. Morales Group)	Hepatic oncology (BCLC) (Dr. Reig Group)

About the co-supervision: The PhD will be hosted by the Hepatocellular Signaling and Cancer group, experts in liver cancer mechanisms, signaling, immunology, and translational research. Co-supervision will be provided by Dr. Marco Sanduzzi-Zamparelli, a specialist in HCC and immuno-oncology from the Hepatic Oncology (BCLC) group. In particular, Dr. Marí will lead training in HCC mechanisms, signaling, and translational models, while Dr. Sanduzzi-Zamparelli will contribute expertise in HCC, immuno-oncology, and clinical perspectives. Active co-supervision is guaranteed through regular joint meetings, shared oversight of experimental design, and collaborative support in data dissemination. Furthermore, the candidate will be fully integrated into the BCLC network, benefiting from the combined resources, clinical insights, and international visibility of both research groups.

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Examples of secondments opportunities: Maastricht University (The Netherlands, Europe); Münster University (Germany, Europe); INSERM (France, Europe).

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RL28. Neurobiological substrates of suicidal behavior in adolescents with first-episode psychosis: A translational study of neuron-derived extracellular vesicle miRNAs (DYNAMIR-ADO)

Key words: Adolescence; First-Episode Psychosis (FEP); Suicidal Behavior (SB); Neuronal-Derived Extracellular Vesicles (NEVs); miRNAs; Precision Psychiatry.

Abstract: The DYNAMIR-ADO project aims to identify non-invasive biomarkers for suicidal behavior (SB) in adolescents with first episodes of psychosis (FEP). By utilizing validated clinical instruments, the project seeks to define clinically and biologically distinct phenotypes. While suicide is a leading cause of youth mortality, its neurobiology remains elusive due to the lack of access to live brain tissue. We hypothesize that neuron-derived extracellular vesicles (NEVs) isolated from plasma act as liquid biopsies, carrying miRNA signatures that reflect synaptic and inflammatory dysregulation in the adolescent brain. The study employs a dual-arm translational approach. Clinical arm: we will profile miRNAs in plasma NEVs from FEP adolescents (with/without SB) and healthy controls. Using dual L1CAM/SNAP25-based immunocapture and small RNA-seq, we will identify specific molecular fingerprints of suicidal risk. Preclinical arm: To explore underlying mechanisms, we will establish human-mouse chimeric models by infusing patient-derived NEVs into the adolescent mouse brain. We will assess their capacity to induce SB-related behavioral deficits, synaptic remodeling, and neuroinflammatory alterations. DYNAMIR-ADO advances biological psychiatry by mapping central pathology onto peripheral signals. By integrating NEVs-miRNA profiling with clinical and psychological data, we seek a biologically-grounded stratification to enable early intervention and precision medicine in youth mental health.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Analia Bortolozzi Biassoni (analia.bortolozzi@iibb.csic.es) Systems neuropharmacology (Dr. Bortolozzi Group)	Dr. Inmaculada Baeza (ibaeza@clinic.cat) Child and adolescent psychiatry and psychology (Dr. Baeza Group)

About the co-supervision: This line integrates the Systems Neuropharmacology group, experts in brain circuits and RNA therapies, and the Child and Adolescent Psychiatry and Psychology group, specialists in early-onset psychosis and clinical management of youth patients. Located within the IDIBAPS biomedical hub, researchers will access state-of-the-art molecular laboratories and extensive clinical cohorts. The synergy between the supervisors' expertise ensures a world-class training ground for biological psychiatry and youth mental health research. In particular, Dr. Bortolozzi will lead the experimental and molecular components of the research, by providing expertise in advanced molecular biology (e.g., isolation and characterization of neuron-derived extracellular vesicles (NEVs), miRNA

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sequencing) and bioinformatics. Furthermore, her team will supervise the development of the chimeric human-mouse models, stereotaxic surgeries, and the high-throughput behavioral and neuropathological characterization of the *in vivo* effects of human NEVs. Dra. Baeza will provide the essential clinical and translational framework, through patient recruitment and the clinical stratification of adolescent cohorts into first-episode psychosis (FEP) with and without suicidal behavior. Her group will provide expertise in clinical management and phenotypic characterization of young patients, ensuring the correlation of molecular NEV data with patient clinical outcomes and psychological profiles. This framework ensures integration of basic and clinical perspectives, supporting strong translational training and development of an independent researcher. Co-supervision will involve regular joint meetings and coordinated analysis of molecular and clinical data.

Examples of secondments opportunities: McGill University (Canada); Institute of Psychiatry (King's College, London, Europe).

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RL29. Precision medicine through exercise: Decoding extracellular vesicles mediating cardiovascular protection in type 1 diabetes

Key words: Exercise; Type 1 diabetes; cardiovascular risk; extracellular vesicles; multi-OMICs; microRNAs.

Abstract: Type 1 diabetes (T1D) is associated with a markedly increased cardiovascular risk that persists despite advances in glycemic control and remains the leading cause of morbidity and mortality. Physical exercise is a cornerstone of non-pharmacological therapy; however, different exercise modalities induce distinct cardiovascular adaptations, and the molecular mechanisms underlying these effects in T1D remain poorly understood. Extracellular vesicles (EVs) are emerging as key mediators of intercellular communication, transporting bioactive cargos such as microRNAs and proteins that regulate endothelial function, inflammation and vascular homeostasis. Although exercise modulates circulating EV cargo, comparative EV-mediated molecular responses to different exercise modalities in T1D have not been systematically explored. This research line aims to compare the effects of high-intensity interval training (HIIT) and strength training on cardiovascular risk factors and endothelial function in people with T1D, while identifying EV-associated multi-omic signatures (miRNAs and proteomics) linked to vascular protection. By integrating exercise physiology, cardiovascular phenotyping, and state-of-the-art organ-on-chip models, the project will elucidate molecular pathways translating exercise into cardiovascular benefit, offering a unique opportunity for an early-stage researcher to gain immersive training in both molecular and clinical research on a challenging disease such as T1D.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Joan-Marc Servitja (servitja@recerca.clinic.cat) Pathogenesis and prevention of diabetes (Dr. Novials Group)	Dr. Antonio Amor (ajamor@clinic.cat) Translational research in diabetes, lipids and obesity (Dr. Vidal Group)

About the co-supervision: The Pathogenesis and Prevention of Diabetes group focuses on diabetes pathophysiology, exercise interventions and translational biomarker discovery, with access to specialized exercise facilities, molecular laboratories and omics platforms. The Translational research in diabetes, lipids and obesity group, based in the Diabetes Unit at Hospital Clínic Barcelona, has internationally recognized expertise in vascular imaging and cardiovascular risk evaluation in T1D. The proximity between IDIBAPS and Hospital Clínic enables seamless clinical-translational interaction. Dr. Servitja will act as primary supervisor, leading project design, exercise interventions, EV-miRNA and proteomics profiling, organ-on-chip experimental strategies, and integrative data analysis, providing daily supervision and laboratory training. Dr. Antonio Amor will act as co-supervisor, overseeing

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cardiovascular risk evaluation, arterial imaging, and clinical interpretation of vascular outcomes in T1D. Co-supervision will be implemented through regular joint meetings, shared milestones, and coordinated decision-making, ensuring continuous involvement of both groups throughout the PhD.

Examples of secondments opportunities: Steno Diabetes Center Copenhagen (Denmark, Europe), Institute for Bioengineering of Catalonia - IBEC (Barcelona).

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RL30. Immune-brain axes in mood disorders, from pre-clinical and *in vitro* models to human clinical cases

Key words: humanized mouse models, multi-omics, human patients, human samples, clinical data.

Abstract: Bipolar disorder (BD) and other mood disorders are characterized by chronic neuroinflammation, which is thought to be caused, at least in part, by peripheral immune signals such as cytokines, chemokines, and growth factors (collectively referred to as the secretome). However, the underlying molecular mechanisms, as well as the specific brain regions and neural circuits affected by this dysfunctional communication between the immune system and the central nervous system in the context of BD, remain largely unknown. The candidate will participate in a research line involving the following objectives: 1) Collection and isolation of the immune secretome from patients with BD (type I or type II) and from control individuals. 2) Molecular characterization of the secretome as well the circulating immune cells, with the aim of identifying specific molecular signatures associated with distinct clinical symptoms. 3) Investigation of the effects of these secretomes on neural circuit function in vitro, using primary rodent neurons, and assessment of changes in neural activity and associated molecular pathways. 4) Evaluation of whether these secretomes induce a bipolar disorder-like phenotype in mice, along with an exploration of the underlying molecular mechanisms.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Gerard Anmella (anmella@clinic.cat) Bipolar and depressive disorders (Dr. Vieta Group)	Dr. Albert Giralt (albertgiralt@ub.edu) Pathophysiology and treatment of neurodegenerative disorders (Dr. Alberch Group)

About the co-supervision: Dr. Giralt will train the candidate on the isolation and molecular characterization of immune secretomes from patients with BD and on the generation of humanized mouse models as well as primary rodent neuronal models. Furthermore, he will train the candidate on the evaluation of complex behavioural phenotypes in mice. The group of Dr. Anmella will provide clinical training in bipolar disorder, including direct patient contact, clinical assessment using standardised scales (HDRS, YMRS), and understanding of longitudinal course specifiers such as predominant polarity, rapid cycling, and seasonality. As PI of an ongoing ISCIII-funded project on extracellular vesicles in BD, Dr. Anmella will also contribute translational expertise linking molecular findings to clinical phenotypes. The co-supervision will follow a phased, integrated model. During year 1, the candidate will be primarily based in Dr. Giralt's laboratory to acquire wet-lab competencies while attending weekly clinical sessions with Dr. Anmella to build familiarity with BD phenomenology and patient cohorts. In year 2, the candidate will begin integrating clinical and molecular data, with

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biweekly joint supervision meetings. Year 3 will include an international secondment and advanced analyses linking secretome profiles to clinical variables, while the last year will focus on paper(s) publication and thesis completion and dissemination. Throughout the project, monthly three-way progress meetings between the candidate and both supervisors will ensure alignment and continuity.

Examples of secondments opportunities: Douglas Research Centre/McGill University (Canada); Deakin University/IMPACT (Australia); University of Freiburg (Germany, Europe); University of Utrecht (Netherlands, Europe); University of Basel (Switzerland, Europe).

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RL31. Linking metabolic pathways & T-Cell dysfunction in eosinophilic granulomatosis with polyangiitis (EGPA): A single-cell and functional strategy to define biomarkers of response to Th2-targeted therapies

Key words: Eosinophilic granulomatosis with polyangiitis (EGPA); vasculitis; T-cell; metabolism; biomarkers; Th2 therapies.

Abstract: EGPA is a rare ANCA-associated vasculitis with eosinophilic inflammation and asthma. Despite improved outcomes with glucocorticoids and anti–IL-5 therapies, many patients show incomplete responses, highlighting the need for predictive biomarkers. Increasing evidence supports a key role for $CD4^+$ T cells. Our previous transcriptomic data indicated a dysregulated Th2 response reinforcing the relevance of Th2-targeted therapies. Beyond canonical immune pathways, these data also revealed enrichment of hypoxia-related and ROS metabolic pathways, suggesting that metabolic reprogramming contributes to T-cell dysfunction and disease persistence. Building on these findings, we propose an integrated research line combining single-cell transcriptomics and functional metabolic studies to characterize $CD4^+$ T-cell states in EGPA. Specifically, we aim to: 1) Identify transcriptional signatures and immune cell subsets associated with response or resistance to Th2-targeted therapies; 2) Define the metabolic programs (e.g., hypoxia signaling, oxidative stress, mitochondrial function) underlying T-cell activation and differentiation in EGPA; 3) Evaluate how Th2-targeted therapies modulate both immune and metabolic pathways in $CD4^+$ T cells. This approach will move beyond eosinophil-centered view of EGPA by linking immune dysregulation with metabolic remodeling. The identification of immune–metabolic signatures may provide novel biomarkers of therapeutic response and uncover new targets.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Georgina Espígol Frigolé (gespigol@clinic.cat) Systemic vasculitis (Dr. Cinta Cid Group)	Dr. Glòria Garrabou Tornos (garrabou@clinic.cat) Inherited Metabolic Diseases and Muscular Disorders (Dr. Garrabou Group)

About the co-supervision: The Systemic Vasculitis group investigates inflammatory and vascular remodeling mechanisms in vasculitis using targeted and omics approaches, functional models and clinical cohorts. Dr. Garrabou's group focuses on rare metabolic and muscular disorders, combining advanced multi-omic technologies with pathology, biochemistry and functional studies. Both groups foster a positive environment through excellence and regular meetings. The Systemic Vasculitis group will lead the clinical and immunological components, including EGPA patient recruitment, sample processing, and functional immune assays, ensuring clinical relevance and patient stratification. The Inherited Metabolic Diseases and Muscular Disorders group will lead the metabolic and multi-omic

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analyses, including functional metabolic assays, mitochondrial studies, and integration of transcriptomic and metabolic data to identify immune–metabolic signatures. Co-supervision will be implemented through regular joint meetings, shared decision-making in experimental design and data interpretation, and continuous interaction. Both groups will ensure integrated training and active involvement throughout all project stages.

Examples of secondments opportunities: NIH (Bethesda, US); Miller School of Medicine (Miami, US); University of Zurich, (Switzerland, Europe).

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RL32. Development and Clinical Validation of Biosensor Technologies

Key words: Biosensors; sensor design; clinical validation; biomedical applications; diagnostics; analytical devices.

Abstract: The research line focuses on the design, development, and application of biosensors for biomedical and clinical use. We aim to create sensitive, reliable, and user-friendly sensing platforms capable of detecting relevant biological markers in complex samples, mainly focused in adrenal disease (cortisol, aldosterone, androgens and other steroidogenic hormones metabolites). The work integrates principles of sensor engineering, surface functionalization, and signal transduction to achieve high performance and reproducibility. A key objective is to translate biosensor technologies from the laboratory to real-world settings, with particular emphasis on clinical validation and applicability. We evaluate sensor performance using relevant biological samples to ensure accuracy, robustness, and compliance with practical requirements in healthcare environments. The approach also considers scalability, cost-effectiveness, and ease of use, facilitating the development of diagnostic tools suitable for routine use, including point-of-care applications. This research line aims to contribute to advancing rapid, precise, and accessible diagnostic solutions that support improved patient care and decision-making.

Co-supervisors

Clinical	**Basic/Translational**
Dr. Felicia A Hanzu (fhanzu@clinic.cat) Endocrine disorders: crosstalk between molecular, metabolic and therapeutic determinants (Dr. Hanzu Group)	Dr. Pedro Melgar-Lesmes (pmelgar@ub.edu) Biomarkers and laboratory precision medicine in hepatology, metabolism, and rare diseases (HEMERA-Lab) (Dr. Morales-Ruiz Group)

About the co-supervision: Two complementary research groups at IDIBAPS–Hospital Clínic, both internationally recognized experts in the field, participate in this project: the Endocrine Disorders group, with strong expertise in the pathophysiology, diagnosis, and treatment of disorders of the hypothalamic–pituitary–adrenal axis, and the HEMERA Lab, which focuses on biomarker discovery and laboratory precision medicine, contributing advanced analytical and translational research capabilities. The project will be co-supervised by two senior researchers with complementary expertise, ensuring full translational coverage from materials development to clinical application. One co-supervisor, with strong experience in materials science and analytical validation, will lead the development, optimisation, and analytical performance assessment of the biosensor platforms, ensuring robustness, sensitivity, and reproducibility. The second co-supervisor, embedded in a clinical research environment, will oversee clinical validation and evaluate the medical relevance and utility of the developed technologies in real-world settings. Co-supervision will be continuous and structured through regular joint meetings, shared experimental planning, and integrated

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decision-making across all stages of the project. Both participating research groups will be actively involved: the materials/analytical group will focus on device engineering and validation, while the clinical group will provide access to patient samples, clinical cohorts, and expertise in translational implementation. This dual framework will ensure a seamless integration of engineering and clinical perspectives.

Examples of secondments opportunities: Institute of Materials Science of Barcelona - ICMAB-CSIC/ Institute of Microelectronics Barcelona - IMB-CNM, CSIC (Spain, Europe).

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RL33. Decoding Obsessive-Compulsive disorder: A Cross-Species, Computational Approach

Key words: Obsessive Compulsive disorder (OCD); animal models; decision making; computational models; brain imaging; basal ganglia; dopamine.

Abstract: We offer a PhD position within an interdisciplinary research line on Obsessive - Compulsive Disorder (OCD), integrating computational neuroscience, rodent models, and clinical research. The project aims to uncover the mechanisms underlying compulsive behaviors by combining experimental and analytical approaches across species. The candidate will be co-supervised by a computational neuroscientist and rodent behavior expert (JdlR), and a clinician-researcher (MAF), providing a unique training environment that bridges basic and translational science. This setting allows investigation of neural circuits and behavior in animal models alongside the study of symptoms and cognitive processes in patients. The PhD candidate will gain training in state-of-the-art rodent techniques, computational modeling approaches, and the analysis of well-characterized clinical cohorts. Opportunities include collecting new data in clinical samples and analyzing existing datasets with brain imaging data in OCD populations (for example, through the ENIGMA neuroimaging consortium (https://enigma.ini.usc.edu/) of which supervisor Fullana is a leading member. This position is ideal for candidates interested in linking brain circuit mechanisms, behavior, and clinical outcomes through innovative, cross-disciplinary research.

Co-supervisors

Basic/Translational	**Clinical**
Dr. Jaime de la Rocha Vázquez (jrochav@recerca.clinic.cat) Cortical circuit dynamics (Dr. De la Rocha Group)	Dr. Miquel Angel Fullana (MAFULLANA@clinic.cat) Imaging of mood- and anxiety-related disorders (IMARD) (Dr. Raduà Group)

About the co-supervision: The candidate will be embedded in a highly collaborative, interdisciplinary environment integrating computational and systems neuroscience with the clinical investigation of OCD. Close and complementary supervision will ensure exposure to diverse methodologies and perspectives, fostering the development of an integrative research profile. In particular, Dr. de la Rocha will provide expertise in rodent experimentation (i.e., automated behavior, optogenetics, photometry, and electrophysiology), as well as in the analysis and modeling of behavior in both animals and patients. Dr. Fullana will oversee access to patient cohorts, clinical data collection, and the translational interpretation of findings. This will include supervision of clinical assessments and ensuring the relevance of experimental findings to human OCD phenotypes. He will also facilitate engagement with hospital-based research environments and ensure appropriate ethical oversight.

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Examples of secondments opportunities: University of Tübingen/ Max Planck Institute for Biological Cybernetics (Germany, Europe).

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