DC1 - Advancements in clinical understanding and treatment of anti-IgLON5 disease

Host Institution

Fundació de Recerca Clínic Barcelona-Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS)

Location

Barcelona, Spain

PhD enrolment

Universitat de Barcelona (UB)

Supervisors

Dr. Lidia Sabater, Pathogenesis of autoimmune neuronal disorders research group
Dr. Carles Gaig, Clinical Neurophysiology

Research Project description

This PhD project aims to improve the **clinical** understanding of anti-IgLON5 disease by studying its natural history using longitudinal clinical data and biological samples. The work will focus on evaluating disease progression and outcomes through established and new emerging **biomarkers** of inflammation and neurodegeneration, as well as exploring biomarker approaches with relevance for therapeutic development in tau-related disorders. Overall, the project seeks to bridge clinical observation and translational research, contributing to improved disease stratification, patient management, and **awareness.**

Main objectives:

1. We aim to study the natural history of the disease using retrospectively and prospectively collected clinical information and samples.
2. To evaluate progression and outcome of anti-IgLON5 disease through biomarkers of inflammation and neurodegeneration.
3. Discovery of new fluid biomarkers to speed up the development of valuable treatments for tauopathies.

Desirable project-specific qualifications and skills

MD degree, Neurologist. Knowledge of Spanish and/or Catalan is recommended, or willingness to learn quickly, as they may be required for interaction with patients. Strong interest in autoimmune diseases of the CNS, neurodegeneration, and/or sleep disorders. Enthusiasm for patient-oriented research and translational neuroscience. Willingness to work in a dynamic and collaborative clinical and research environment.

Foreseen mobility

Doctoral Candidate will probably go to MUV (Austria) to be trained in neuropathology of neurodegenerative diseases and to EMC (Netherlands) and UKSH (Germany) to contribute to the biomarker discovery.

DC2 - Understanding contributions of adaptive and innate immunity in neurodegeneration

Host Institution

Erasmus Universitair Medisch Centrum Rotterdam (EMC)

Location

Rotterdam, Netherlands

PhD enrolment

EMC

Supervisors

Dr. Marteen Titulaer, Neurology unit
Dr. Juna M de Vries, Neurology unit

Research Project description

This PhD project aims to identify tauopathy-associated neuronal, microglial, and astrocytic populations in patients with anti-IgLON5 disease and other tauopathies. Using single-nucleus RNA sequencing, next-generation sequencing (NGS), and immunohistochemistry, the project will define relevant cell-type-specific signatures. Complementary cerebrospinal fluid (CSF) analyses will provide insights into the molecular pathways driving pathology and their potential translational relevance for therapeutic development.

Main objectives:

1. To characterize tauopathy-associated cellular populations using transcriptomic and histological approaches.
2. To integrate CSF molecular profiling for biomarker discovery.
3. To identify disease-relevant pathways that may guide future targeted interventions.

Desirable project-specific qualifications and skills

Interest and/or experience in bioinformatics
Knowledge of immunology and/or neuroscience
Experience with cell culture or other laboratory techniques

Foreseen mobility

Doctoral Candidate will probably complete the training in biomarker identification, validation and identification in terms of clinical relevance during secondments in UKSH (Germany) and MUV (Austria). Also, in MUV (Austria), the candidate will acquire complementary knowledge in neuropathology.

DC3 - Multiparametric analysis of biomarkers of neuroinflammation and neurodegeneration in anti-IgLON5 disease and other tauopathies

Host Institution

Universitatsklinikum Schleswig-Holstein (UKSH)

Location

Kiel, Germany

PhD enrolment

Christian-Albrecht University of Kiel (CAU)

Supervisors

Dr. Frank Leypoldt, Neuroimmunology group
Depending on profile:
Dr. Ligia Abrante (Cloning, TCR, BCR), Neuroimmunology group
Dr. Daniela Esser (Bioinformatics), Neuroimmunology group

Research Project description

This PhD project offers a laboratory-based and/or bioinformatics-focused position aimed at elucidating immunological mechanisms and biomarkers that influence clinical outcomes in anti-IgLON5 disease. The work will center on generating and analyzing sequencing-based biomarkers from CSF and blood and integrating these molecular findings with clinical phenotypes, disease severity, and progression.

Main objectives:

1. To clone, express, and functionally characterize **recombinant human monoclonal IgLON5 antibodies and T cell receptors (TCRs)** to investigate antigen-specific immune mechanisms and IgLON5-related dysfunction.

2. To profile established and novel **humoral and molecular biomarkers** in CSF and blood—including **BCR/TCR repertoire sequencing**—and correlate these signatures with clinical phenotype, disease severity, and disease course.

3. To define **IgLON5-specific transcriptional and immune repertoire signatures** using single-cell and single-nucleus sequencing approaches together with advanced bioinformatics, and to compare these profiles with those observed in primary tauopathies.

Desirable project-specific qualifications and skills

Desirable profiles include experimental/translational or computational neuroimmunology backgrounds.
Experimental profile: MD or life sciences degree, with hands-on experience in BCR/TCR cloning, cell culture, flow cytometry, protein expression, functional assays, Ficoll/PBMCs. Preferably patient-derived samples for single-cell workflows and neuroimmunology experience.
Computational profile: degree in bioinformatics or related fields, proficiency in Python/R and Linux/HPC, expertise in sc/snRNA-seq and BCR/TCR analyses; ML/AI is a

plus.

Hybrid profiles bridging wet-lab, computational and/or clinical expertise, or willing to cross-train, are especially encouraged.

Foreseen mobility

Doctoral Candidate will probably do secondments in EMC (Netherlands) and MUV (Austria) to train in the clinical evaluation of patients and to complement their project regarding biomarkers

DC4 - From Lab to Market: Developing diagnostic kits for antibodies against cell surface antigens and leveraging new biomarkers in neurodegenerative diseases

Host Institution

Biosystems S. A. (BS)

Location

Barcelona, Spain

PhD enrolment

Universitat de Barcelona (UB)

Supervisors

Dr. Pere Carulla, Biosystems S. A. (BS)
Dr. Petraki Munujos, Biosystems S. A. (BS)

Research Project description

This PhD project aims to design and optimize **diagnostic kits** for the accurate detection of antibodies targeting specific neuronal surface antigens, ensuring sensitivity and specificity suitable for clinical implementation. Parallel studies will characterize IgLON5 **binding partners** to better understand its role in neuronal signalling. The project will also promote collaboration with academic and industry stakeholders to facilitate clinical adoption and increase awareness of new disease-related biomarkers.

Main objectives:

1. To develop and validate high-performance diagnostic kits for antibody detection.
2. To identify and characterize IgLON5 binding partners.
3. To support translational partnerships enabling implementation in clinical settings.

Desirable project-specific qualifications and skills

Background in neurosciences, biology, or related natural sciences.
Interest and/or experience in molecular biology, cell cultures, microscopy techniques and autoimmunity.
Also, interest in scale up, production process and regulatory affairs.
Spanish and/or Catalan is recommended.
Willingness to work in a dynamic and collaborative research environment.

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) to work intertwined and complement their project.

DC5 - Dissection of cell-intrinsic and cell-nonautonomous anti-IgLON5 disease mechanisms *in vitro*

Host Institution

Fondazione Human Technopole (HT)

Location

Milan, Italy

PhD enrolment

Humanitas University (HUNIMED)

Supervisors

Dr. Oliver Harschnitz, Harschnitz group
Dr. Stefania Giussani, Harschnitz group

Research Project description

This PhD project aims to establish advanced human ***in vitro*** **models** of IgLON5 disease using iPSC-derived monocultures and co-cultures comprising neurons, astrocytes, and microglia. In combination with CRISPR/Cas9 gene-editing, single cell RNA-seq and high-resolution imaging, these models will be used to dissect IgLON5 antibody–mediated pathogenic mechanisms, to determine cell-type-specific contributions to neurodegeneration, and to investigate tau phosphorylation abnormalities induced by anti-IgLON5 antibodies.

Main objectives:

1. To generate robust iPSC-based Central Nervous System (CNS) multicellular models of IgLON5 disease.
2. To study cell type-specific vulnerability and pathogenic mechanisms triggered by IgLON5 antibodies.
3. To characterize tau-related alterations emerging from antibody exposure.

Desirable project-specific qualifications and skills

Experience in molecular biology and human pluripotent stem cell cultures

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) to complement their project, and in CNRS (France) to study the dynamics of IgLON5 in CNS cells.

DC6 - Neuropathological studies on anti-IgLON5 disease human brains and other neurodegenerative diseases

Host Institution

Medizinische Universitaet Wien (MUV)

Location

Vienna, Austria

PhD enrolment

MUV

Supervisors

Dr. Romana Hoftberger, Head of Division of Neuropathology and Neurochemistry
Dr. Inga Koneczny, Division of Neuropathology and Neurochemistry

Research Project description

This PhD project aims to identify neuropathological alterations in brains affected by anti-IgLON5 disease, focusing on neuronal loss, protein aggregation, and related histopathological signatures. Using advanced immunohistochemistry, immunofluorescence, and quantitative imaging, the candidate will investigate disease hallmarks while gaining comprehensive training in human neuroanatomy and neuropathology, preparing for research or biomedical careers.

Main objectives:

1. To define the neuropathological features of anti-IgLON5 disease in human brain tissue.
2. To apply advanced histological and imaging methodologies.
3. To establish clinicopathological correlations supporting disease characterization.

Desirable project-specific qualifications and skills

Background in biomedical or life sciences, with interest in neuroscience or neurodegenerative diseases.
Motivation to work with human tissue and research imaging techniques, and willingness to develop specialised laboratory skills.
Hands-on experience with histological or microscopy methods, or interest in learning advanced immunohistochemistry and quantitative imaging approaches.

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) as a close collaboration involving patient samples and UKSH (Germany) to learn molecular techniques.

DC7 - The mechanisms of tau pathological spreading in anti-IgLON5 disease

Host Institution

Universidade de Coimbra (UC)

Location

Coimbra, Portugal

PhD enrolment

UC

Supervisors

Dr. Luís Ribeiro, Multidisciplinary Institute of Ageing (MIA)
Dr. Ester Coutinho, Synapse Biology

Research Project description

This PhD project investigates **tau propagation mechanisms** in anti-IgLON5 disease and assesses the contribution of IgLON5 antibodies to tau pathology in *in vivo* and *in vitro* systems. The studies will determine whether tau exhibits prion-like seeding behaviour and whether disease progression resembles primary tauopathies or depends on ongoing autoimmune activity.

Main objectives:

1. To analyse tau spreading and seeding properties in IgLON5-related models.
2. To determine the impact of IgLON5 antibodies on tau pathology dynamics.
3. To compare disease evolution with classical tauopathies.

Desirable project-specific qualifications and skills

Interest or experience in:
iPSCs: derivation, culture, differentiation...
Electrophysiology
Imaging techniques including fluorescence, confocal, and live-cell imaging
Advanced data analysis, scientific programming

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) and HT (Italy) to complement their project. The candidate will collaborate with the researcher at PWR (Poland) to study tau aggregation.

DC8 - Connecting scRNAseq to CyTOF single cell proteomics in anti-IgLON5 disease. Involvement of lysosomal cathepsins and legumain in tau cleavage using iPSC-derived neurons treated with anti-IgLON5 antibodies

Host Institution

Politechnika Wroclawska (PWR)

Location

Wroclaw, Poland

PhD enrolment

PWR

Supervisors

Dr. Marcin Poreba, Department of Chemical Biology and Bioimaging, , Faculty of Chemistry
Dr. Natalia Malek, Department of Chemical Biology and Bioimaging, , Faculty of Chemistry

Research Project description

This PhD project aims to characterize activity of lysosomal cathepsins in **immune cells** and their involvement in the molecular mechanisms implicated in anti-IgLON5 disease, particularly those that contribute to tau aggregation and neurodegeneration. Using patient-derived samples and/or experimental models, the project will explore key enzymatic, inflammatory, and cellular pathways, with the goal of identifying novel therapeutic targets. The project will be carried out in an interdisciplinary manner, integrating the development of novel chemical tools, their application in flow and/or imaging mass cytometry, and iPSC culture and analysis.

Main objectives:

1. Preparation of novel chemical tools and their utilization in mass cytometry technology.
2. To profile immune responses and cellular signatures associated with anti-IgLON5 pathology.
3. To study mechanisms linking immune dysfunction with tau-related neurodegeneration.
4. To highlight actionable pathways for future therapeutic strategies.

Desirable project-specific qualifications and skills

Solid background in chemical, biomedical or life sciences, with interest in neuroscience
Hands-on experience with some of the following techniques will be an additional asset: iPSC-derived cultures, flow cytometry, imaging of neuronal tissue,
Some familiarity with lysosomal biology and/or protein degradation pathways in immune-cells, or willingness to learn aforementioned
Motivation to work with patient-derived samples and experimental models, and to develop strong research skills.
Ability to work independently as well as collaboratively in an interdisciplinary team,

Good organizational skills and proactive, problem-solving attitude

Foreseen mobility

Doctoral Candidates will probably do secondments in UC (Portugal) and UKSH (Germany) to complement their project. The candidate will collaborate with HT (Italy) for iPSC training.

DC9 - Passive transfer of anti-IgLON5 to generate an anti-IgLON5 disease animal model

Host Institution

Universidade de Coimbra (UC)

Location

Coimbra, Portugal

PhD enrolment

UC

Supervisors

Dr. Ester Coutinho, Center for Neuroscience and cell biology
Dr. Luís Ribeiro, Multidisciplinary Institute of Ageing (MIA)

Research Project description

The project will test the pathogenicity of IgLON5 antibodies through passive transfer experiments to support the autoimmune hypothesis of the disease. Initially, we will assess the pathogenic potential of different patient-derived autoantibodies to induce tau pathology in vitro, using human neuronal models, including human iPSC-derived neurons. The most promising autoantibodies will then be tested in vivo. Ultimately, this PhD project aims to generate an animal model to characterize its brain proteome and phosphoproteome using tandem mass tag–based proteomics.

Main objectives:

1. To assess antibody pathogenicity and validate disease mechanisms *in vitro*.
2. To develop and characterize an anti-IgLON5 disease animal model.
3. To analyse brain proteome and phosphoproteome remodeling in anti-IgLON5 disease.

Desirable project-specific qualifications and skills

Interest or experience in:
iPSCs: derivation, culture, differentiation...
Stereotaxic injections: intrabrain administration
Mass spectrometry
Biochemical assays
Imaging techniques, including fluorescence, confocal, and live-cell imaging
Advanced data analysis, scientific programming

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) to collaborate in the animal model and in BS (Spain) to study IgLON5 interactome.

DC10 - Anti-IgLON5 encephalopathy induced in mice by active immunization and therapeutic approaches

Host Institution

Fundació de Recerca Clínic Barcelona-Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS)

Location

Barcelona, Spain

PhD enrolment

Universitat de Barcelona (UB)

Supervisors

Dr. Lidia Sabater, Pathogenesis of autoimmune neuronal disorders research group
Dr. Jesús Planagumà, Pathogenesis of autoimmune neuronal disorders research group

Research Project description

This PhD project aims to analyse the neuro-immunobiology of an active-immunization animal model of anti-IgLON5 disease. Behavioural characterization will be correlated with clinical symptoms observed in patients. The project will examine brain alterations via immunohistochemistry and evaluate therapeutic strategies, including anti-CD20 immunosuppression and tau-targeted treatments.

Main objectives:

1. To characterize clinical and behavioural manifestations in an active-immunization model.
2. To study brain pathology associated with anti-IgLON5 antibodies.
3. To evaluate immunomodulatory and anti-tau therapeutic interventions.

Desirable project-specific qualifications and skills

Previous experience or demonstrated interest in working with laboratory animals (mouse models)
Familiarity with basic animal handling and experimental procedures (e.g. injections, perfusion, tissue collection)
Knowledge of or exposure to confocal microscopy and image analysis
Basic experience in electrophysiological techniques
Experience with cell culture techniques (primary cultures or cell lines)
Background in neuroscience, immunology, or related biomedical research fields
Willingness to work in a dynamic and collaborative clinical and research environment.

Foreseen mobility

Doctoral Candidate will probably do a secondment in UC (Portugal) to study alterations in synapsis in the animal brains, and in MUV (Austria) to complete the neuropathology studies.

DC11 - Study of the prognostic value of IgLON5-ab subclasses and pathogenic effect on muscle cells

Host Institution

Medizinische Universitaet Wien (MUV)

Location

Vienna, Austria

PhD enrolment

MUV

Supervisors

Dr. Inga Koneczny, Division of Neuropathology and Neurochemistry
Dr. Romana Hoftberger, Head of Division of Neuropathology and Neurochemistry

Research Project description

This PhD project aims to evaluate IgLON5 **antibody subclasses** as biomarkers of disease progression and outcome. It will also examine the pathogenic role of IgG4 antibodies in muscle cell cultures. These studies will clarify the relevance of subclass quantification for prognosis, deepen understanding of IgLON5's role in muscle physiology, and establish mechanisms by which IgG4 interferes with IgLON5 interactions.

Main objectives:

1. To assess IgG subclass distribution as a biomarker of disease activity.
2. To investigate IgG4-mediated effects in muscle cell models.
3. To define mechanisms of IgG4-dependent disruption of IgLON5 function

Desirable project-specific qualifications and skills

General background in biomedical or life sciences, with interest in immunology or molecular pathology.
Experience with cell culture models and cell-based functional assays, or interest in developing skills relevant to studying IgG4-mediated mechanisms.

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) and UKSH (Germany) to validate common biomarker protocols; and in HT (Italy) to work with iPSC-derived muscle cells.

DC12 - Crosstalk between IgLON5, binding partners and synapse in health and disease

Host Institution

Centre National De La Recherche Scientifique (CNRS)

Location

Paris, France

PhD enrolment

University of Bordeaux (UBx)

Supervisors

Dr. Laurent Groc, Neurosciences
Dr. Jesús Planagumà, Pathogenesis of autoimmune neuronal disorders research group

Research Project description

This PhD project investigates whether IgLON5 functions as a **synaptic protein** using super-resolution microscopy, binding assays, and single-particle tracking. The aim is to determine IgLON5's synaptic relevance, confirm interactions with identified binding partners, and analyse its dynamics in neuronal cultures, including those with cytoskeletal disruptions induced by IgLON5 antibodies.

Main objectives:

1. To evaluate IgLON5 localization and function at synapses.
2. To confirm binding interactions with identified molecular partners.
3. To track IgLON5 movement under physiological and antibody-mediated pathological conditions.

Desirable project-specific qualifications and skills

Interest in neurobiology and cell imaging; experience in microscopy, cell culture, and molecular biology will be plus value

Foreseen mobility

Doctoral Candidate will probably do secondments in IDIBAPS (Spain) and UC (Portugal) to learn culture of neurons and work with patient antibodies.

DC13 - *In vivo* mechanisms of IgLON5 antibodies on learning and memory consolidation

Host Institution

Universitaetsklinikum Jena (UKJ)

Location

Jena, Germany

PhD enrolment

UKJ

Supervisors

Dr. Christian Geis, Head of the Department of Neurology
Dr. Josefine Sell, Translational Neuroimmunology

Research Project description

This PhD project aims to elucidate the pathophysiological effects of IgLON5 antibodies on synaptic transmission, synaptic plasticity, and hippocampal network oscillations. By investigating how antibody exposure alters **neuronal function**, the project will clarify mechanisms leading to cognitive impairment, including deficits in memory consolidation.

Main objectives:

1. To assess how IgLON5 antibodies alter synaptic and network physiology.
2. To identify cellular and molecular drivers of functional impairment.
3. To link synaptic dysfunction with memory-related deficits.

Desirable project-specific qualifications and skills

Background in neurosciences, biology, or related natural sciences, Special interest in electrophysiology techniques, microscopy techniques, strong motivation and eligibility to work with animal models Interest or experience in programming, ideally using Python and MATLAB, Hands-on experience with electrophysiological techniques.

Foreseen mobility

Doctoral Candidate will probably do secondments in CNRS (France) to provide functional information on IgLON5 in synapsis; and in UC (Portugal) to perform IgLON5 phospho-proteome. The candidate will also collaborate with IDIBAPS (Spain) regarding animal models.