

Pathophysiology of Lipid-related Disease

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DESCRIPTION

The Pathophysiology of Lipid-Related Diseases Group is an interdisciplinary and translational research team that primarily focuses on lipoprotein metabolism and dyslipidemias. These disorders are causally linked to atherosclerotic cardiovascular disease and are closely associated with the development of type 2 diabetes, metabolic syndrome, Alzheimer's disease, and certain forms of cancer. Our research aims to identify novel, potentially targeted therapies and biomarkers related to lipid abnormalities in the aforementioned diseases, to improve diagnosis and patient management.

MAIN LINES OF RESEARCH

- Lipoprotein metabolism variations, focusing on HDL and remnant lipoproteins, and their links to atherosclerotic cardiovascular disease, type 2 diabetes, and specific cancers. Emphasis on lipoprotein functions as novel prognostic biomarkers (Joan Carles Escolà Gil and Marina Canyelles Vich).
- New microRNAs as determinants of metabolic pathways related to homocysteine and as regulators of lipoprotein metabolism and atherosclerosis progression, as well as their therapeutic use in vivo (Noemí Rotllan).
- Diagnosis and molecular characterization of metabolic disorders, mainly of endocrinological or metabolic nature. The optimization and validation of analysis methods for conducting these studies have been carried out in our laboratory through innovation activities (Francisco Blanco Vaca and Mireia Tondo).



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- Lipid-related biomarkers for the diagnosis of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, and other dementias. This line is relatively new and specific to Dr. Mireia Tondo, who collaborates regularly with the Memory Unit of the Neurology Service of our hospital.
- García Rodríguez, Jesus Eduardo. Formación de Personal Universitario. FPU21/01173. Ministerio de Universidades. Duration: 2022-2026. 74.857,00 €.
- Illana Camara, Francisco Jose. Desarrollo de un método de detección de ADN libre circulante metilado para la detección de cáncer colorrectal. SEQC 2022. Fundación José Luis Castaño. Duration: 2022-2023. 6.000,00 €.

SCIENTIFIC CHALLENGES

- Investigate if PCSK9 antibodies correct HDL dysfunction in familial hypercholesterolemia.
- Explore HDL-associated miRNAs' role in coronary heart disease and assess vascular effects of miRNA-enriched sHDL nanoparticles.
- Examine CSF HDL-like lipoproteins from Alzheimer's disease patients for their ability to promote cholesterol efflux in astrocytes and mediate cholesterol delivery in neurons.
- Assess blood biomarkers' diagnostic accuracy for Alzheimer's disease pathophysiology on an automated platform and CSF biomarkers' for Parkinson's disease through RT-QulC.
- Evaluate vascular smooth muscle cells 'cholesterol efflux pathways' contribution to atherosclerosis progression.
- Julve Gil, Josep. Therapeutic potential of nicotine supplement on adiposity, impaired insulin signaling and non-alcoholic liver fatty disease severity. PI2100770. Instituto de Salud Carlos III (ISCIII). 2022-2024. 122.210,00 €.
- Revilla Senra, Giovanna. TMAO y su relación con la disfuncionalidad de HDL y el riesgo de enfermedad coronaria en pacientes con hipercolesterolemia familiar y diabetes tipo 2. FI19/00007. Instituto de Salud Carlos III (ISCIII). Duration: 2020-2023. 82.400,00 €.
- Rotllan Vila, Noemi. Potenciales microRNAs como nuevas dianas terapéuticas en la arteriosclerosis relacionada con hiperhomocisteinemia. PID2019-104367RB-I00. Ministerio de Ciencia e Innovación (MICINN). Duration: 2020-2023. 96.800,00 €.
- Rotllan Vila, Noemi. Subprograma Contratos Ramón y Cajal 2017. RYC-2017-22879. Ministerio de Ciencia, Innovación y Universidades (MICIU). Duration: 2019-2024. 168.600,00 €.

ACTIVE GRANTS

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- Borrás Querol, Carla. Formación de Personal Universitario. FPU21/01173. Ministerio de Universidades. Duration: 2021-2025. 74.156,00 €.
- Canyelles Vich, Marina. Juan Rodés. JR22/00003. Instituto de Salud Carlos III (ISCIII) Duration: 2023-2026. 180.000,00 €.
- Escola Gil, Juan Carlos. Adiposidad, inflamación y la desregulación del colesterol en el carcinoma de tiroides. Evaluación de estrategias terapéuticas basadas en la reducción del colesterol y la activación de LXR. PI19/00136. Instituto de Salud Carlos III (ISCIII). Duration: 2020-2024. 111.320,00 €.

GRANTS AWARDED

- Canyelles Vich, Marina; Escolà Gil, Joan Carles. Impacto de las lipoproteínas remanentes y HDL en el riesgo cardiovascular: evaluación de biomarcadores predictivos en el estudio prospectivo Di@bet.es y un estudio longitudinal en sujetos con diabetes tipo 2. Competitiu. Expedient: PI23/00232. Instituto de Salud Carlos III. Duration: 2024-2026. 165.000,00 €.
- Rotllan Vila, Noemí. Role of HDL miRNA in coronary heart disease incidence; Customised miR-sHDL as strategy for atherosclerosis treatment. MARATO 202312-31 Expedient: 82/225. Fundació La Marató de TV3. Duration: 2024-2027. 75.375,00 €.
- Rotllan Vila, Noemi. Células vasculares lisas, transporte reverso de colesterol y miRNAs: Mecanismos patofisiológicos y nuevas dianas para



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prevenir la enfermedad cardiovascular. PID2022-137186OB-I00. Ministerio de Ciencia, Innovación y Universidades. Duration: 2024-2026. 187.500,00 €.

DOCTORAL THESES DEFENDED

- Revilla Senra, Giovanna. Action of cholesterol, 27-hydroxycholesterol and adipose tissue in Thyroid Cancer. 22/12/2023. Universitat Autònoma de Barcelona. Supervisors: Escolà Gil, Joan Carles; Mató Matute, Eugènia.
- Gallinat O'Callaghan, Alex. Molecular basis of ischemic post-conditioning: DJ-1 in cardioprotection. 30/01/2023. Universitat Autònoma de Barcelona. Supervisors: Badimon Maestro, Lina; Blanco Vaca, Francisco. <http://hdl.handle.net/10803/688588>
- Vilella Figuerola, Alba. Circulating cell-derived extracellular vesicles and epigenetic small non-coding ribonucleic acids in chronic heart failure. 28/03/2023. Universitat Autònoma de Barcelona. Supervisors: Badimon Maestro, Lina; Padró Capmany, Teresa; Blanco Vaca, Francisco. <http://hdl.handle.net/10803/689764>

SCIENTIFIC PRODUCTION

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- Canyelles M, Blanco F, Pérez A, Escolà JC. Comment on Huh et al. Remnant Cholesterol Is an Independent Predictor of Type 2 Diabetes: A Nationwide Population-Based Cohort Study. *Diabetes Care* 2023;46:305-312. *DIABETES CARE*. 2023; 46(10):e203. DOI:10.2337/dc23-0774. PMID:37729500. IF:16,200 (Q1/1D). Document type: Letter.
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- Ferrer R, Mansilla A, Tondo M, Blanco F. Remnant cholesterol: new outcomes highlight its potential as a clinically useful cardiovascular risk factor. *Journal Of Laboratory And Precision Medicine*. 2023; 8:A5. DOI:10.21037/jlpm-22-70. Document type: Note.
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