

Biomarkers for Cardiovascular Disease

Group leader

Padro Capmany, Teresa (IR)

Researchers

De Santisteban Villaplana, Victoria Marta (IR)

García Arguinzonis, Maisa Ines (IR)

Research Technicians

Gomez-Pardo Arellano, Montserrat (IR)



DESCRIPTION

The group's research focuses on the identification and characterization of molecular and cellular biomarkers of atherothrombosis and ischaemic heart disease with potential applications in prevention, diagnosis, risk stratification, and treatment. Research covers a range of cardiovascular diseases at both subclinical and clinical stages. It includes studies on tissue remodeling, inflammation, atherosclerosis, thrombosis, and risk factors. Biomarkers and potential therapeutic targets are investigated in animal models and clinical samples, and mechanistically in cell culture studies.

MAIN LINES OF RESEARCH

- Biomarkers and molecular targets of vascular remodeling in atherosclerosis progression, thrombosis, and subsequent ischemic events (Proteomic-based studies).
- Extracellular matrix and cardiac remodeling post-myocardial infarction.
- Circulating extracellular vesicles (microvesicles / exosomes) in subclinical and clinical cardiovascular diseases.
- Functional epigenomics (plasma and total blood non-coding RNAs): Novel biomarkers in cardiovascular diseases and special groups at high CVD risk (Familial Hypercholesterolemia).
- Lipidome and metabolome regulation in cardiovascular disease prevention.

SCIENTIFIC CHALLENGES

- Identify and characterize new biomarkers and molecular targets of tissue remodeling in athe-



05.1.1 Cardiovascular Diseases Area

rosclerotic vessels and cardiac tissue post-myocardial infarction.

- Generate new information on circulating non-coding RNAs and extracellular vesicles (microvesicles /exosomes) due to their specific feature as carriers of non-coding RNAs (miRNA, lncRNAs) and proteins derived from the parental cells providing precise bioprints of defined pathophysiological scenarios and consequently being ideal biomarker candidates of disease evolution.
- The use of "omic" approaches and in silico studies to identify and characterize circulating biomarkers associated with cardiovascular disease, both in biological fluids (serum, plasma, urine) and carried by lipoproteins or microvesicles. Studies will include proteomic technologies based on liquid chromatography/bidimensional electrophoresis and mass spectrometry, lipidomic approaches using mass spectrometry coupled to ultra-performance liquid chromatography and nuclear magnetic resonance (NMR), transcriptomic studies (mRNA, non-coding RNA) based on array systems, next-generation sequencing, and real-time PCR.
- To validate novel biomarkers (proteins / non-coding RNAs) for prognosis and risk-stratification of cardiovascular diseases in clinical cohorts.
- Characterisation at the cellular level of molecular and functional mechanisms (gene and protein expression regulation, epigenetic regulation, sub-cellular distribution of proteins, paracrine effects, cell functions) for selected biomarkers/molecular targets in cardiovascular pathology and myocardial remodeling.

ACTIVE GRANTS

- Padro Capmany, Teresa. Identificación en la matriz extracelular post-infarto de moléculas estimulantes de regeneración cardiaca (MATRI-REG). PI22/01930. Instituto de Salud Carlos III (ISCIII). Duration: 2023-2025. 171.820,00 €.
- Padro Capmany, Teresa. Reparación de la matriz estructural miocárdica en el corazón infartado: Papel regulador de la Adipsina, una proteína de inmunidad innata asociada al matrisoma de la matriz extracelular. PI19/01687. Instituto de Salud Carlos III (ISCIII). Duration: 2020-2023. 177.870,00 €.

- Padro Capmany, Teresa. TRANSBIOLINE: Translational Safety Biomarker Pipeline (TransBioLine): Enabling development and implementation of novel safety biomarkers in clinical trials and diagnosis of disease. TRANSBIOLINE 821283. Unión Europea. Duration: 2019-2024. 182.600,00 €.
- Padro Capmany, Teresa. COVIRNA: Medical technologies, digital tools and artificial intelligence analytics to improve surveillance and care at high technology readlines. COVIRNA 101016072. Unión Europea. Duration: 2020-2023. 273.943,00 €.
- Padro Capmany, Teresa. Efectos del probiótico "AB-Life" sobre la cantidad y perfil de ácidos biliares, y el perfil lipídico y metabólico en sujetos sanos con sobrepeso moderado. Non-competitive. AB-BIOTICS. Duration: 2020-2022. 277.052,00 €.

GRANTS AWARDED

- Padro Capmany, Teresa. Impact of lipoprotein molecular and functional composition and inflammation on ACVD clinical event presentation in familial hypercholesterolemia (LipoComp). 202329-10. Fundació La Marató de TV3. Duration: 2024-2027. 199.997,50 €

DOCTORAL THESES DEFENDED

- 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

- Antoniades C, Tousoulis D, Vavlukis M, Fleming I, Duncker DJ, Eringa E, Manfrini O, Antonopoulos AS, Oikonomou E, Padro T, Trifunovic D, De Luca G, Guzik T, Cenko E, Djordjevic A, Crea F. Perivascular adipose tissue as a source of therapeutic targets and clinical biomarkers A clinical consensus statement from the European Society of Cardiology Working Group on Coronary Pathophysiology and Micro-circulation. EUROPEAN HEART JOURNAL. 2023; 44(38)DOI:10.1093/eurheartj/ehad484. PMID:37599464. IF:39,300 (Q1/1D). Document type: Article.



05.1.1 Cardiovascular Diseases Area

- Badimon L, Vilahur G, Padro T, Mendieta G. Cardiovascular residual risk: etiology, lipids and inflammation. *Revista Española De Cardiología Suplementos*. 2023; 23DOI:10.1016/S1131-3587(23)00008-0. Document type: Article.
- Benincasa G, Suades R, Padrò T, Badimon L, Napoli C. Bioinformatic platforms for clinical stratification of natural history of atherosclerotic cardiovascular diseases. *European Heart Journal-Cardiovascular Pharmacotherapy*. 2023; 9(8) DOI:10.1093/ehjcvp/pvad059. PMID:37562936. IF:7,100 (Q1/1D). Document type: Article.
- Borrell M, Luquero A, Vilahur G, Padró T, Badimon L. Canonical Wnt pathway and the LDL receptor superfamily in neuronal cholesterol homeostasis and function. *CARDIOVASCULAR RESEARCH*. 2023; DOI:10.1093/cvr/cvad159. PMID:37882606. IF:10,800 (Q1/1D). Document type: Article.
- Cordero A, Munoz N, Padro T, Vilahur G, Bertomeu V, Escribano D, Flores E, Zuazola P, Badimon L. HDL Function and Size in Patients with On-Target LDL Plasma Levels and a First-Onset ACS. *INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES*. 2023; 24(6):5391. DOI:10.3390/ijms24065391. PMID:36982465. IF:5,600 (Q1/3D). Document type: Article.
- de Isla LP, Diaz JL, Romero MJ, Muniz O, Mediavilla JD, Argueso R, Munoz JS, Rubio P, Alvarez P, Ponte P, Manas D, Gutierrez LS, Cepeda JM, Casanas M, Fuentes F, Guijarro C, Barba MA, Cerezo AS, Padro T, Mata P, SAFEHEART GRP. Alirocumab and Coronary Atherosclerosis in Asymptomatic Patients with Familial Hypercholesterolemia: The ARCHITECT Study. *CIRCULATION*. 2023; 147(19)DOI:10.1161/CIRCULATIONAHA.122.062557. PMID:37009731. IF:37,800 (Q1/1D). Document type: Article.
- Gallinat A, Vilahur G, Padro T, Badimon L. Effects of Antioxidants in Fermented Beverages in Tissue Transcriptomics: Effect of Beer Intake on Myocardial Tissue after Oxidative Injury. *Antioxidants*. 2023; 12(5):1096. DOI:10.3390/antiox12051096. PMID:37237963. IF:7,000 (Q1/1D). Document type: Article.
- García MC, Padro T, Munoz N, Bianchi M, Alvarez L, Badimon L, Corbella E, Pinto X. Dysfunctional antioxidant capacity of high-density lipoprotein in rheumatoid arthritis. *EUROPEAN JOURNAL OF CLINICAL INVESTIGATION*. 2023; 53(8):e13999. DOI:10.1111/eci.13999. PMID:36994808. IF:5,500 (Q1/3D). Document type: Article.
- Haller PM, Gossling A, Magnussen C, Brenner H, Schottker B, Iacoviello L, Costanzo S, Kee F, Koenig W, Linneberg A, Sujana C, Thorand B, Salomaa V, Niiranen TJ, Soderberg S, Volzke H, Dorr M, Sans S, Padro T, Felix SB, Nauck M, Petersmann A, Palmieri L, Donfrancesco C, De Ponti R, Veronesi G, Ferrario MM, Kuulasmaa K, Zeller T, Ojeda FM, Blankenberg S, Westermann D, BiomarCaRE C. Biomarker-based prediction of fatal and non-fatal cardiovascular outcomes in individuals with diabetes mellitus. *European Journal of Preventive Cardiology*. 2023; 30(12)DOI:10.1093/eurjpc/zwad122. PMID:37079290. IF:8,300 (Q1/2D). Document type: Article.
- López A, Padro T, Villaplana VD, Muñoz N, Pérez A, Vilahur G, Badimon L. Vascular and Platelet Effects of Tomato Soffritto Intake in Overweight and Obese Subjects. *Nutrients*. 2023; 15(24):5084. DOI:10.3390/nu15245084. PMID:38140343. IF:5,900 (Q1/2D). Document type: Article.
- Padro T, Cenko E, Tousoulis D. The ESC Working Group on Coronary Pathophysiology and Microcirculation. *EUROPEAN HEART JOURNAL*. 2023; 44(46)DOI:10.1093/eurheartj/ehad650. PMID:37772387. IF:39,300 (Q1/1D). Document type: News Item.
- Padro T, López A, Pérez A, Vilahur G, Badimon L. Dietary ? Fatty Acids and Phytosterols in the Modulation of the HDL Lipidome: A Longitudinal Crossover Clinical Study. *Nutrients*. 2023; 15(16):3637. DOI:10.3390/nu15163637. PMID:37630826. IF:5,900 (Q1/2D). Document type: Article.
- Radike M, Sutelman P, Ben S, Gutiérrez M, Mendieta G, Alcover S, Casaní L, Arderiu G, Borrell M, Padró T, Badimon L, Vilahur G. A comprehensive and longitudinal cardiac magnetic resonance imaging study of the impact of coronary ischemia duration on myocardial damage in a highly translatable animal model. *EUROPEAN JOURNAL OF CLINICAL INVESTIGATION*. 2023; 53(1):e13860. DOI:10.1111/eci.13860. PMID:35986736. IF:5,500 (Q1/3D). Document type: Article.



05.1.1 Cardiovascular Diseases Area

- Schoch L, Alcover S, Padró T, Ben S, Mendietta G, Badimon L, Vilahur G. Update of HDL in atherosclerotic cardiovascular disease. *Clinica E Investigacion En Arteriosclerosis*. 2023; 35(6) DOI:10.1016/j.arteri.2023.10.002. PMID:37940388. IF: 1,600. Document type: Review.
- Suades R, Vilella A, Padro T, Mirabet S, Badimon L. Red Blood Cells and Endothelium Derived Circulating Extracellular Vesicles in Health and Chronic Heart Failure: A Focus on Phosphatidylserine Dynamics in Vesiculation. *INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES*. 2023; 24(14):11824. DOI:10.3390/ijms241411824. PMID:37511585. IF:5,600 (Q1/3D). Document type: Article.
- Vilella A, Cordero A, Mirabet S, Munoz N, Suades R, Padro T, Badimon L. Platelet-Released Extracellular Vesicle Characteristics Differ in Chronic and Acute Heart Disease. *THROMBOSIS AND HAEMOSTASIS*. 2023; 123(9) DOI:10.1055/s-0043-57017. PMID:37075787. IF:6,700 (Q1/2D). Document type: Article.
- Badimon L, Padro T, Vilahur G. Chapter 27: Moving from reactive to preventive medicine. *Aging*. 2023; 663-681. DOI: 10.1016/B978-0-12-823761-8.00003-3. Document type: Book Chapter.