Irene Marín Goñi

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Education

Mayo Clinic

Visiting Graduate Student — *Nov 2022 - Apr 2025* — *USA*

- **Cancer and translational Certificate courses:** Genomic Analysis of Complex Traits, Molecular Variant Evaluation, Cancer Biology, Molecular Genetics, Drug Metabolism, Molecular Pharmacology of Receptor Signaling.
- **Advisor**: Liewei Wang MD, PhD (***Pharmacogenomics and Drug Targets Lab, Mayo Clinc***)

University of Navarra

PhD in Computational Biology — *Sep 2021 - Currently* — *Spain*

- **Research topic:** Understanding molecular mechanisms of abiraterone resistance in metastatic castration resistant prostate cancer.
- **Courses:** Bioinformatics, Statistics, Research Ethics, Advanced Computational Biology methods, Experimental Animal Work, Intellectual Property.
- **Teaching:** Biostatistics, Introduction to Chemistry and Nutrition.
- **Advisors**: Mikel Hernaez PhD (***Machine Learning in Biomedicine Lab, CIMA***) and Liewei Wang MD, PhD

MSc in Computational Methods in Science — *Sep 2020 - Sep 2021* — *Spain*

- **Courses:** Computer Programming Languages, Biostatistics, NGS data processing and analysis, Machine Learning and Deep Learning (Intro), Data Analytics.

Joint program Master's of Pharmacy and BSc in Human Nutrition and Dietetics — *Sep 2013 - Feb 2020* — *Spain*

- **Pharmacy Internships**: 3 months at community pharmacy Greenlight Pharmacy-Stepney (UK), 3 months at hospital pharmacy Clinica Universidad de Navarra (Spain) and 1 month in Hospital Clinical Analysis Laboratory (Spain).
- **International Exchange Programs**: Cornell University (USA), University of Ipswich (UK), Amsterdam University of Applied Sciences (NL).
- **GPA**: 3.45 or 9.32/10 (**Top 5** in Pharmacy) and 3.4 or 9.23/10 (**Top 1** in Nutrition)
- Senior Class Student Representative.

Research Experience

Wet lab Research projects

PhD thesis project at Mayo Clinic — *Sep 2022 - Dec 2024* — *Spain*

- **Main project**: Targeting of CDK12/13 and androgen pathways in metastatic castration-resistant prostate cancer. **PI**: Dr.Wang.

Research Summer Intern at Navarrabiomed — *Jun 2021 - July 2021* — *Spain*

- ***Cancer Signaling Lab***: Study of the effects on the expression of PD-L1 in glioma and breast cancer cells of ranolazine, a disruptor of the lipid metabolism. **PI**: Imanol Arozarena PhD

Undergraduate research projects at University of Navarra — *2016 - 2020* — *Spain*

- **PharmD Degree Thesis:** Evaluation of the cytotoxic activity of solid lipid nanoparticles loaded with edelfosine in a neuroblastoma model.
- **BSc Nutrition Degree Thesis:** Evaluation of the nutritional regulation of PRDM1 in murine adipocytes.
- **Research Intern**: Evaluation of organoselenium compounds in lipolysis proteins in murine adipocytes.

Computational Research projects

Human Tumor Atlas Network (HTAN) — *November 6-8, 2024* — *NIH Campus, Bethesda, MD*

- Attended in-person to the **HTAN Data Jamboree**. The goal is to collaboratively build unique solutions that solve relevant problems in cancer research using NCI CRDC cloud resources and HTAN data and public datasets (**spatial omics and single cell**). *Manuscript in progress*

Mayo Clinic collaborations — *Nov 2022 - Current* — *Rochester, MN (USA)*

- **High throughput drug screening in PDX models** of metastatic castration resistant prostate cancer patients to overcome abiraterone resistance. **PI**: Liewei Wang MD, PhD.
- **Analysis of RNAseq data** of LSD1 inhibitors for prostate cancer treatment **PI**: Dr.Wang.
- **Analysis of single nuclei-RNAseq data** of syngeneic model of triple negative breast cancer treated with DNMTi and immunotherapy. **PI**: Dr.Wang.
- **Spatially resolved transcriptomics** of cardiac fibrosis associated with dilated cardiomyopathy in transgenic mice. **PIs**: Naveen Pereira, MD. and Richard Weinshilboum MD, PhD.
- **Other collaborations:** Bioinformatic support for alcohol use disorder project. **PIs**: Duan Liu, PhD. and Richard Weinshilboum MD, PhD.

CIMA Universidad de Navarra — *Sep 2021 - Current* — *Spain*

- **Main PhD research topic:** Understanding molecular mechanisms of abiraterone resistance in metastatic castration resistant prostate cancer through bulk, single cell and spatial transcriptomics.
- **MSc Dissertation project:** Study of the differential gene regulatory networks in the context of metastatic castration-resistant prostate cancer and abiraterone treatment. Collaboration with Mayo Clinic.
- **Other collaborations:**:
  Interpretable Causal Representation Learning for Biological Data in the Pathway Space
  Sweetwater: An interpretable and adaptive autoencoder for efficient tissue deconvolution
  Study of gene regulatory networks with Quantum Computing.

Research Scholarships

Postgraduate program fellowship

LaCaixa Foundation — *Aug 2023 - Dec 2024* — *USA*

2-year excellence fellowship for studies abroad. Intended to support my research stay at Mayo Clinic.

PhD studies fellowship

Spanish Government — *Dec 2023 - Currently* — *Spain*

4-year full-time Government-funded scholarship for PhD student stipend.

PhD studies fellowship and mobility fellowship

Government of Navarra — *Feb 2023 - Dec 2023* — *Spain*

3-year full-time funded scholarship for PhD student tuition and stipend with additional support for research stay in Mayo Clinic.

PhD studies fellowship

CIMA University of Navarra — *Sep 2022 - Feb 2023* — *Spain*

Funded through Congressionally-directed medical research program (CDMRP) grant (US Department of Defense)

Honors and Awards

2020	**Special End of Studies Award ,** for BSc in Human Nutrition and Dietetics, recognition for **Top 1** student of each major class (GPA: 3.4 or 9.23/10)	*University of Navarra*
Fall 2018	**Dean's List ,** College of Human Ecology (GPA 4.162)	*Cornell University*
2017 - 2018	**Senior Class Student Representative,** elected by Pharmacy School classmates	*University of Navarra*

Publications

2025

Interpretable Causal Representation Learning for Biological Data in the Pathway Space
Jesús de la Fuente, Robert Lehmann, Carlos Ruiz-Arenas, ***Irene Marín-Goñi***, Jan Voges, Xabier Martinez de Morentin, David Gomez-Cabrero, Idoia Ochoa, Jasper Tegnér, Vincenzo Lagani, Mikel Hernáez
*Accepted manuscript (**ICLR**)* (2025)

FNDC4 Alters Glutamatergic and GABAergic Neurogenesis
Xiujuan Zhu, John J August, Li Wang, Kim Soan, Enci Ding, Ateka Saleh, ***Irene Marín-Goñi***, Huanyao Gao, Ching Man Wai, Irene Moon, Brandon Coombes, Tony M Kerr, Noboyushi Suto, Liewei Wang, Mark A. Frye, Joanna Biernacka, Victor Karpyak, Hu Li, Richard M. Weinshilboum, Duan Liu
Under revision in Journal of Clinical Investigation (2025)

Sweetwater: An interpretable and adaptive autoencoder for efficient tissue deconvolution
Jesús de la Fuente, Naroa Legarra, Guillermo Serrano, ***Irene Marín-Goñi***, Aintzane Diaz-Mazkiaran, Markel Benito Sendin, Ana Garcia Osta, Krishna R. Kalari, Carlos Fernandez-Granda, Idoia Ochoa, Mikel Hernáez
arXiv. Under second review at Nucleic Acid Research, 2023 (2024)

2024

NetActivity enhances transcriptional signals by combining gene expression into robust gene set activity scores through interpretable autoencoders
Carlos Ruiz-Arenas, ***Irene Marín-Goñi***, Liewei Wang, Idoia Ochoa, Luis A Pérez-Jurado, Mikel Hernaez
Nucleic Acids Research 52.9 (2024) e44–e44

2023

Bayesian machine learning enables identification of transcriptional network disruptions associated with drug-resistant prostate cancer
Charles Blatti, Jesús de la Fuente, Huanyao Gao, ***Irene Marín-Goñi***, Zikun Chen, Sihai D Zhao, Winston Tan, Richard Weinshilboum, Krishna R Kalari, Liewei Wang
Cancer research 83.8 (2023) pp. 1361–1380

Conferences:

Presented

Overcoming resistance in mCRPC: drug discovery using PDX models and high-throughput drug screening
Irene Marín-Goñi, Huanyao Gao, Joachim L. Petit, Shreya Indulkar, Adam M. Kase, Cassandra N. Moore, Krishna R. Kalari, Michael T. Barret, Richard Weinshilboum, Wiston Tan, John A. Copland III, Liewei Wang
Poster presented *in the American Association of Cancer Research (**AACR Meeting**)* (2025)

Targeting of CDK12/13 and androgen pathways in metastatic castration-resistant prostate cancer
Irene Marín-Goñi, Shreya Indulkar, August John, Huanyao Gao, Mikel Hernaez, Liewei Wang
Poster presented *in the American Society for Clinical Pharmacology and Therapeutics (**ASCPT Meeting**)* (2025)

Identification of transcriptional network disruptions associated to drug resistance in cancer with TraRe
Charles Blatti, Jesús de la Fuente, Huanyao Gao, ***Irene Marín-Goñi***, Zikun Chen, Sihai D Zhao, Winston Tan, Richard Weinshilboum, Krishna R Kalari, Liewei Wang, Mikel Hernaez
Poster presented *in the European Conference of Computational Biology (**ECCB**)* (2022)

Accepted

Role of CDCP1 in Cardiac Fibrosis: spatially resolved gene expression profile in a Pressure Over-Load Mouse Model
Irene Marín-Goñi, Li Wang, Min Wang, Rachad Ghazal, Will Sherman, Hridyanshu Vyas, Carolyn Roos, Runqing Huang, August John, Tamas Ordog, Mathew Wang, Liu Duan, Laura Lambert, Richard Weinshilboum, Naveen Pereira
*Abstract accepted for poster presentation to American College of Cardiology (**AAC**) Meeting* (2025)

Discovery of a novel compound target CDCP1 to modulate human cardiac fibrosis
Rachad Ghazal, Manikandan Selvaraj, Wang Min, Zhang Heyu, *Irene Marín-Goñi*, Mathew Coban, Caleb Weber, Naeyma Islam, Jessica Abbott, Duan Liu, Laura Lambert, Richard Weinshilboum, Thomas Caulfield, Naveen Pereira
*Abstract accepted for poster presentation at the Basic Cardiovascular Sciences scientific sessions (**BCVS**) of American Heart Association (AHA)* (2025)

Interpretable Causal Representation Learning for Biological Data in the Pathway Space
Jesús de la Fuente, Robert Lehmann, Carlos Ruiz-Arenas, *Irene Marín-Goñi*, Jan Voges, Xabier Martinez de Morentin, David Gomez-Cabrero, Idoia Ochoa, Jasper Tegnér, Vincenzo Lagani, Mikel Hernáez
*Poster accepted at AIDrugX (**NeurIPS**)* (2024)

Encoding gene expression into gene set activity scores using neural networks
Carlos Ruiz-Arenas, *Irene Marín-Goñi*, Idoia Ochoa, Mikel Hernaez, Luis A Pérez-Jurado
*Poster accepted at Machine Learning for Computational Biology (**MLCB**)* (2023)

Bayesian Machine Learning Enables Identification of Transcriptional Network Disruptions Associated with Drug-Resistant Prostate Cancer
Charles Blatti, Jesús de la Fuente, Huanyao Gao, *Irene Marín-Goñi*, Zikun Chen, Sihai D Zhao, Winston Tan, Richard Weinshilboum, Krishna R Kalari, Liewei Wang
*Oral and Poster accepted at International Society for Computational Biology (**ISCB**), TransMed* (2021)